1991-1992
AIR QUALITY DATA SUMMARY

REGIONAL MUNICIPALITY OF NIAGARA

NOVEMBER 1993

Ontario

Ministry of
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REGIONAL MUNICIPALITY OF NIAGARA

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1. INTRODUCTION

This report summarizes the results of air monitoring in the Regional Municipality of Niagara in 1991 and 1992.

The Ministry of Environment and Energy has conducted routine monitoring in the area since the early 1970's. The Air Management Program in Ontario is based on controlling man made emissions to meet ambient air quality objectives, which in turn are based on known effects on health, quality of life or sensitive vegetation, whichever is the most stringent. To achieve these objectives, sources of pollution are identified, their emissions evaluated and appropriate control measures are instituted. Ambient air monitoring is used to identify pollution sources, evaluate the need for controls and then determine whether controls have been successful.

In addition to monitoring specific industrial sources, monitoring of general air quality is conducted in various localities to determine if air quality objectives are being met and to observe trends in air pollution.

In June, 1988, the Ministry commenced broadcasting the new Air Quality Index across the Province at over 30 locations, including St. Catharines and Niagara Falls. A description of the AQI and the 1991 and 1992 results appear in this report.

2. MONITORING NETWORK

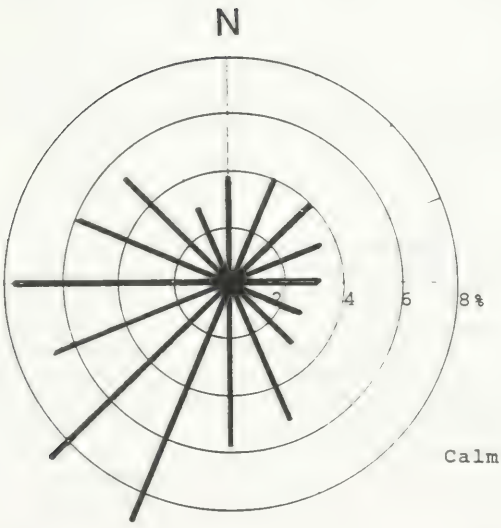
The Ministry of Environment and Energy operates a network of monitors in the Regional Municipality of Niagara in Niagara Falls, Chippawa, Port Colborne, St. Catharines, Thorold, and Welland. The Air Quality Index (AQI) was measured in St. Catharines and Niagara Falls and was used as a warning system to alert the public to elevated air pollution levels.

Meteorological data (wind and temperature) were measured near Allanburg. Figure I illustrates the wind frequency distribution for the area and shows that winds from the southwest quadrant predominate. Consequently, wherever possible, fixed stations are normally located "downwind" of suspected pollution sources with respect to these wind directions.

Wind data was used in a computer program known as a "pollution rose" - essentially a cross-tabulation of average hourly pollutant concentrations with wind direction. The data from this program are illustrated on some maps in this report and are a useful tool in determining the impact of any given source on a monitoring station. The length of each line of the "rose" is proportional to the average yearly concentration when the wind was blowing from that direction.

Some of the instrumentation used in the network is provided by Environment Canada under the National Air Pollution Surveillance (NAPS) program. The instruments are operated and maintained by the Ministry and data from the NAPS stations are provided to Environment Canada.

FIGURE 1
WIND FREQUENCY DISTRIBUTION
27011 ALLANBURG
1992



Lines indicate direction from which wind blew

3. POLLUTANTS MONITORED

Two basic types of air pollutants are measured - gases and particulates (dust).

a) Gases measured with continuous analyzers include:

Sulphur Dioxide (SO_2) - usually monitored near industrial sources but SO_2 is also a product of domestic space heating. Air quality objectives and their limiting factors are:

1-hour average - .25 parts per million (ppm) due to vegetation effects
24-hour average - .10 parts per million (ppm) due to health effects in conjunction with particulates
1-year average - .02 parts per million (ppm) due to vegetation effects

Total Reduced Sulphur (TRS) - measured exclusively near industrial sources. There is a one-hour TRS objective of 27 parts per billion (ppb), however, it is specifically for areas near Kraft pulp mills. There are no such mills in the Niagara Region. The TRS measurement includes hydrogen sulphide (H_2S), the "rotten egg" gas as well as other sulphide compounds. A one-hour objective of 20 ppb exists for H_2s (given below). However, H_2s can actually be smelled at 10 ppb or less.

1-hour average - 20 ppb (odour)

Carbon-Monoxide-(CO) - measured for general ambient levels in St. Catharines. The major source of CO is the automobile.

Objectives for CO are:

1-hour average - 30 ppm (health effects)
8-hour average - 13 ppm (health effects)

Ozone (O_3) - measured in St. Catharines and Niagara Falls to check general ambient levels. Oxidants are products of photochemical reactions involving oxides of nitrogen, hydrocarbons and sunlight. Ozone accounts for most of the oxidants produced. The sources of the precursor pollutants are mainly industrial and automotive. Concentrations follow very definite annual trends with highest levels occurring during the summer, and daily trends with highest levels occurring in mid-afternoon. Both patterns are directly related to temperature and the amount and intensity of sunlight. Ozone and its precursors can be transported over great distances and can be augmented by local sources. Most of the high levels measured in Southern Ontario each summer are generated in the United States. The objective for ozone is:

1-hour average - 80 ppb (vegetation effects)

Oxides of Nitrogen - general ambient levels were measured in St. Catharines. They are a product of high temperature combustion sources including the automobile. The most abundant oxides are nitric oxide (NO) and nitrogen dioxide (NO_2). Objectives exist only for NO_2:

1-hour average - .20 ppm (odour)
24-hour average - .10 ppm (health effects)

b) Particulates are measured by four methods, each relating to a different range of particle sizes.

Dustfall - heavy material generally greater than 10 microns in size (one micron is one-millionth of a metre) that settles out of the atmosphere due to gravity. A plastic container is exposed for one month and the collected dust is weighed and expressed as a deposition rate of grams/square metre/30 days. The measurement is imprecise and observations are restricted to relatively local areas. Criteria are:
1-month average - 7.0 g/m^2/30 days (nuisance effects)
1-year average - 4.5 g/m^2/30 days (nuisance effects)

Total Suspended Particulates (TSP) - measured with high volume (hi-vol) samplers near industrial sources and for general ambient observations. The particles range from submicron to about 50 microns in size. The hi-vol sampler draws air through a glass fibre filter for a 24-hour period. The exposed filter is weighed and the weight of the solids collected is converted to an equivalent concentration in air expressed in micrograms per cubic metre. The samplers run once every six days. Criteria based on visibility and health effects are:

24-hour average - 120 ug/m^3
1 year geometric mean - 60 ug/m^3

Soiling Index (Coefficient of Haze) - measured by tape samplers which measure fine particles less then 10 microns. Industrial sources as well as general ambient air are monitored. Coefficient of haze tape samplers determine hourly soiling values. Air is drawn through a filter paper tape for one hour. A beam of light is shone through the paper before and after the airborne particles are collected. The difference in light transmission is translated into a coefficient of haze (COH) unit. The paper tape then advances and a new hourly sample is collected. The criteria shown below are based largely on correlations with total suspended particulate (TSP). Criteria are:

24-hour average - 1.0 COH's/1000 linear feet of air
1-year average - .5 COH's/1000 linear feet of air

Respirable Particulate (PM10) - measured by hivol samplers outfitted with a special size - fractionating head, which permits only the sampling of particulates 10 microns or less in size. The method is similar to the hivol, except a special quartz filter is used instead of glass fibre. This measurement is intended to address health concerns. No standards/guidelines exist yet in Ontario, but they are being formulated.

c) Air Pollution Index (API) - the API is a subindex of the new AQI. It is derived from 24-hour average concentrations of sulphur dioxide and soiling index, based on the following equations:

St. Catharines

$$API = 3.02\ (2.02\ COH + 193.6\ SO_2).^{74}$$

Niagara Falls

$$API = 2.54\ (11.7\ COH + 123.5\ SO_2).^{80}$$

where:
COH is the 24-hour average soiling index concentration expressed in coefficient of haze units.
SO_2 is the 24-hour average concentration of sulphur dioxide expressed in parts per million.

Values below 32 are considered acceptable. At 32, known as the advisory level and with a forecast of continued unfavourable weather conditions, significant industrial sources may be asked to voluntarily curtail operations. At an API of 50, major emitters would be ordered by law to curtail some operations. At 75, further cutbacks would be required and at 100, all sources not essential to the public health and safety could be ordered to cease operations.

Air Quality Index (AQI) - the AQI is a more comprehensive information system by which the public can be informed about air quality on a daily and even hourly basis. The index replaced the API (described above) which had been in place since 1970. The API still exists as a subindex of the AQI.

In the AQI, hourly concentrations of sulphur dioxide, soiling index (particles), nitrogen dioxide, carbon monoxide, ozone and reduced sulphur compounds are all converted to a common scale of numbers. In addition to these hourly measurements, 8-hour average levels of carbon monoxide and the API, a 24-hour function of sulphur dioxide and particles are also included as subindices, making a total of 8 potential subindices measured every hour. The official AQI is the highest subindex at any given time.

The AQI scale is classified as follows:

0 - 15 Very Good
16 - 31 Good
32 - 49 Moderate
50 - 99 Poor
100+ Very Poor

Index levels up to 31 should have little or no effect on people and the environment. Beginning at the moderate level, effects such as odour, vegetation damage and some health effects to sensitive individuals start to occur.
In the poor and very poor categories, these symptoms become more and more acute, such that virtually all people would be hampered in the very poor range.

When moderate levels or higher are measured, public health advisories can be issued to the public along with the actual index number.

The AQI started in June 1988, and 1991 and 1992 statistics on hourly frequencies in the five concentration categories for nine West Central Region stations are presented in Tables 1a and 1b.

As can be seen, ozone (O_3) was generally the most problematic pollutant across the region. More details on this pollutant and others in the AQI will be discussed in this report.

d) Polynuclear Aromatic Hydrocarbons (PAH)

This is a new measurement by specially outfitted high volume samplers which collect PAH both on a filter and an absorbent cartridge (which lies after the filter). The sampler draws air at a reduced flow rate from the regular hivol and runs for a 24 hour period.

PAHs are a class of compounds which are the product of incomplete combustion of fuels. Several specific PAHs are known to be carcinogenic, including benzo(a)pyrene, (BaP). A scan of 30 compounds is routinely analyzed, but only BaP has standards/guidelines based on health effects.

The criterion is:

Benzo(a)pyrene
24-hour average - 1.1 ng/m^3

The smaller molecular weight PAHs exist in vapour form. The larger ones including BaP exist mostly adsorbed onto particles.

TABLE 1a
AIR QUALITY INDEX - 1991
WEST CENTRAL REGION
HOURLY FREQUENCY DISTRIBUTION

		0 - 15 Very Good	16 - 31 Good	32 - 49 Moderate	50 - 99 Poor	100+ Very Poor
26029/60 KITCHENER	SO_2	8654	0	0	0	0
	COH	7835	76	1	0	0
	O_3	7301	783	77	0	0
	NO_2	8129	0	0	0	0
	CO 1 hr	8729	0	0	0	0
	CO 8 hr	8729	0	0	0	0
	API	7780	48	0	0	0
26045 WATERLOO	SO_2	8713	0	0	0	0
	COH	8478	21	0	0	0
	O_3	8202	380	8	0	0
	API	8486	0	0	0	0
28028 GUELPH	SO_2	8708	0	0	0	0
	COH	8341	10	0	0	0
	O_3	7633	751	134	0	0
	API	8343	0	0	0	0
27067 ST. CATHARINES	SO_2	8707	0	0	0	0
	COH	8092	66	6	0	0
	O_3	7432	782	44	0	0
	NO_2	8656	0	0	0	0
	CO 1 hr	8711	0	0	0	0
	CO 8 hr	8711	0	0	0	0
	API	8132	45	0	0	0
27056 NIAGARA FALLS	SO_2	8677	0	0	0	0
	COH	8202	14	0	0	0
	O_3	6910	788	143	0	0
	NO_2	8179	14	0	0	0
	API	8711	0	0	0	0

TABLE 1a
AIR QUALITY INDEX - 1991
WEST CENTRAL REGION
HOURLY FREQUENCY DISTRIBUTION

		0 - 15 Very Good	16 - 31 Good	32 - 49 Moderate	50 - 99 Poor	100+ Very Poor
29000	SO_2	8721	0	0	0	0
HAMILTON	COH	8257	422	22	0	0
DOWNTOWN	O_3	8179	477	37	0	0
	NO_2	8656	1	0	0	0
	CO 1 hr	8564	0	0	0	0
	CO 8 hr	8564	0	0	0	0
	TRS	8545	90	11	0	0
	API	7807	891	12	0	0
29105	SO_2	8712	0	0	0	0
HAMILTON	COH	8557	172	5	0	0
EAST	O_3	7571	751	155	1	0
	API	8543	202	0	0	0
29114	SO_2	8671	0	0	0	0
HAMILTON	COH	8351	97	1	0	0
MOUNTAIN	O_3	7913	674	85	0	0
	NO_2	3823	0	0	0	0
	TRS	8393	28	1	1	0
	API	8240	196	0	0	0
29118	SO_2	8559	0	0	0	0
HAMILTON	COH	7941	536	51	0	0
WEST	O_3	7564	466	79	0	0
	NO_2	8491	0	0	0	0
	TRS	8304	200	30	2	0
	API	7674	834	0	0	0

TABLE 1b
AIR QUALITY INDEX - 1992
WEST CENTRAL REGION
HOURLY FREQUENCY DISTRIBUTION

		0 - 15 Very Good	16 - 31 Good	32 - 49 Moderate	50 - 99 Poor	100+ Very Poor
26060 KITCHENER	SO_2	8580	0	0	0	0
	COH	8113	56	3	0	0
	O_3	7782	298	16	0	0
	NO_2	8534	0	0	0	0
	CO 1 hr	8275	0	0	0	0
	CO 8 hr	8275	0	0	0	0
	API	8017	68	0	0	0
26045 WATERLOO	SO_2	4550	0	0	0	0
	COH	4612	9	0	0	0
	O_3	4670	95	1	0	0
	API	4395	0	0	0	0
28028 GUELPH	SO_2	8655	0	0	0	0
	COH	7771	12	1	0	0
	O_3	7722	429	46	0	0
	API	7756	0	0	0	0
27067 ST. CATHARINES	SO_2	8737	0	0	0	0
	COH	8307	91	11	0	0
	O_3	8137	297	24	0	0
	NO_2	8535	0	0	0	0
	CO 1 hr	8744	0	0	0	0
	CO 8 hr	8744	0	0	0	0
	API	8363	89	0	0	0
27056 NIAGARA FALLS	SO_2	8677	0	0	0	0
	COH	8505	21	0	0	0
	O_3	7776	419	34	0	0
	API	8475	18	0	0	0

TABLE 1b
AIR QUALITY INDEX - 1992
WEST CENTRAL REGION
HOURLY FREQUENCY DISTRIBUTION

		0 - 15 Very Good	16 - 31 Good	32 - 49 Moderate	50 - 99 Poor	100+ Very Poor
29000	SO_2	8735	0	0	0	0
HAMILTON	COH	7549	540	60	0	0
DOWNTOWN	O_3	8444	231	7	0	0
	NO_2	8719	0	0	0	0
	CO 1 hr	8744	0	0	0	0
	CO 8 hr	8744	0	0	0	0
	TRS	8468	111	12	0	0
	API	6973	1252	46	0	0
29105	SO_2	8710	0	0	0	0
HAMILTON	COH	8204	195	10	0	0
EAST	O_3	8228	230	7	0	0
	TRS	8039	12	2	0	0
	API	8047	377	0	0	0
29114	SO_2	8736	0	0	0	0
HAMILTON	COH	8486	162	7	0	0
MOUNTAIN	O_3	8365	338	15	0	0
	NO_2	7684	0	0	0	0
	TRS	8656	67	11	0	0
	API	8262	425	0	0	0
29118	SO_2	8734	0	0	0	0
HAMILTON	COH	7855	592	65	0	0
WEST	O_3	8404	273	11	0	0
	NO_2	8626	0	0	0	0
	CO	8180	0	0	0	0
	TRS	8351	31	2	0	0
	API	7396	1126	0	0	0

4. DATA ANALYSIS

4.1 Niagara Falls

Sulphur dioxide and soiling index concentrations at the Allendale Avenue AQI Station 27056 (Figure 2 and Table 2a) were low and met all objectives. Figures 3 and 4 show the yearly trends for these two parameters dating back to 1980. Stable levels are evident.

The hourly ozone objective was exceeded 34 times, in 1992 and 144 times in 1991, all in the Moderate range of the AQI. Ground level ozone is a photochemical product of the chemical reaction between nitrogen oxides and certain hydrocarbons in the presence of sunlight. The highest levels all occurred during the summer on hot days during southerly winds and were largely imported from the United States. At these times, levels were high throughout Southern Ontario and the northeastern United States. Figure 5 shows a five year trend of ozone annual exceedances. The fluctuations from year to year are dependent on the climate of each summer.

In recognition of the seriousness of the ozone problem, the Canadian Council of Ministers of the Environment decided in 1988 to develop a management plan for the control of the volatile organic compounds (VOC) and nitrogen oxides (NOx) which generate ground level ozone. A three phase program will be undertaken in Canada. The United States has its own program such that a target date of the year 2005 has been set to resolve the ground level ozone problem.

Upper level ozone, in the upper atmosphere is also a concern but for different reasons. Upper level ozone is beneficial since it absorbs ultraviolet rays from the sun, so any losses are a concern. A program to control the losses in the upper atmosphere is also ongoing but is not the focus of this report.

Suspended particulates (TSP) at station 27056 were generally low and met the yearly objective. The daily objective was not exceeded in either year (Table 2c). The trend of TSP dating back to 1980 is given in Figure 6 and shows a gradual decline in levels to well below the yearly objective.

4.1.1 Monitoring Near General Abrasives Limited

Station 27055 at Stanley St., Niagara Falls, monitored General Abrasive Ltd., (Figure 7). The station lies 500 metres northeast of the company and contained sulphur dioxide (SO_2) and total reduced sulphur (TRS) continuous analyzers, a soiling index tape sampler and a hi-vol.

The data for SO_2 are summarized in Table 2b and Figure 8 and generally show low levels meeting all objectives. TRS data indicates that an ongoing problem has continued although progressive improvements occurred in both years. There were 39 hours in which the objective for hydrogen sulphide was exceeded in 1992 and 144 in 1991 (Table 2b), compared to 161 in 1990. The data can also be compared to the 10 ppb level - an approximate odour threshold for hydrogen sulphide. There were 185 hours above this level in 1992 and 381 hours in 1991, compared to 503 in 1990. Figure 9 depicts a peaking in TRS measured in 1988.

The pollution rose in Figure 10 confirms that General Abrasives was the primary source of TRS as the rose peaks under southwest winds.
The major sources of odours at the General Abrasives plant are the two silicon carbide furnaces. The control system when installed in 1985, was a new design concept. However, modifications were required and the company is continuing to improve efficiency of capture and review operational changes in the incinerator. It has been determined that fugitive emissions through holes in the geodesic domes were a major source of TRS. These holes were caused by the corrosive gases from the furnaces. The company is proceeding with an improved maintenance program for these domes to be completed in 1993.

In addition, source testing in 1992 has showed that the company's exhaust stack was also a major source of hydrogen sulphide. Exhaust gases from the domes were not being completely incinerated and were exhausting through the stack. The company is investigating the incinerator operation and will submit a plan for improvement. The company has instituted a contingency plan such that when hydrogen sulphide odours cause an adverse impact downwind, the company will reduce furnace operations to help lessen odours.

The hi-vol at station 27055 (Stanley St.) measured unacceptably high levels of suspended particulates. The yearly means of 93 and 78 ug/m^3, are well above the objective of 60. A total of 33 out of 109 samples (30%) exceeded the daily objective of 120 ug/m^3. General Abrasives operations were identified as one of the sources of the dust, and south and southwest wind frequency did correlate positively to the readings although other sources were indicated. The trend graph in Figure 11 illustrates a stable trend with no improvements evident.

The sources of dust emissions at General Abrasives were the raw material and product handling operations and the emission control system for the aluminum oxide furnaces. The product and material handling systems have been repaired. Other sources of dust are fugitive in nature such as roads, truck traffic, unpaved lots, etc. The company paved portions of the facility in 1992 to reduce dust from these sources.

The soiling index tape sampler at 27055 (Stanley St.), which measures much finer particles than the hi-vol, showed low concentrations (Table 2b). The daily objective was not exceeded and the yearly average was well below the objective.

Dust fallout in this area would appear to consist primarily of larger particles affecting a very localized area. Due to the low levels of sulphur dioxide and soiling index measured for many years, these two analyzers were removed from service at the end of 1992.

4.1.2. Monitoring Near Cyanamid (Niagara Falls) Limited

Suspended particulates were measured at Station 27050 on Victoria Avenue 500 metres east of Cyanamid Niagara Falls (Figure 7). In 1992, the yearly mean reduced to 43 ug/m^3 and 5 samples out of 113 in 1991/92 exceeded the daily objective (Table 2c). The improvements are shown by the trend graph in Figure 12.

Cyanamid carried out a number of abatement actions to control emissions in 1991. The company installed additional dust collection systems on one furnace and provided capture on an older uncontrolled furnace in 1990.

Other fugitive sources, as identified by visual observations, included outdoor storage piles and roadways, for which the company improved housekeeping activities.

These past actions all led to the improvement observed by station 27050, however, in late 1992 the company ceased operations.

TABLE 2a
SUMMARY STATISTICS - NIAGARA FALLS
CONTINUOUS POLLUTANTS
27056 - ALLENDALE AVENUE AQI

	Year	Average	Maximum 1 hr	Maximum 24 hr	Objectives 1 hr	Objectives 24 hr	Objectives 1 yr	No Times Over Objectives 1 hr	No Times Over Objectives 24 hr
Sulphur Dioxide (SO_2) - ppm	1992	0.004	0.08	0.02	0.25	0.10	0.02	0	0
	1991	0.005	0.05	0.03				0	0
	1990	0.005	0.08	0.02				0	0
Soiling Index COHs/1000 ft	1992	0.21		0.8		1.0	0.50		0
	1991	0.20		0.9					0
	1990	0.24		0.9					0
Ozone (O_3) - ppm	1992	0.023	.110		.08			34	
	1991	0.027	.112					144	
	1990	0.026	.106					93	

TABLE 2b
SUMMARY STATISTICS - NIAGARA FALLS
CONTINUOUS POLLUTANTS NEAR GENERAL ABRASIVES LIMITED
27055 - STANLEY AVENUE

	Year	Average	Maximum 1 hr	Maximum 24 hr	Objectives 1 hr	Objectives 24 hr	Objectives 1 yr	No Times Over Objectives 1 hr	No Times Over Objectives 24 hr
Sulphur Dioxide (SO_2) - ppm	1992 1991 1990	0.003 0.006 0.009	0.09 0.11 0.09	0.03 0.03 0.04	0.25	0.10	0.02	0 0 0	0 0 0
Soiling Index COHs/1000 ft	1992 1991 1990	0.29 0.32 0.35		0.9 1.0 1.0		1.0	0.50		0 0 0
Total Reduced Sulphur ppb	1992 1991 1990	1.5 2.4 3.1	56 55 66		20 (H_2S)			39(185)* 144(381) 161(508)	

*Number in brackets refers to hours over 10 ppb odour threshold

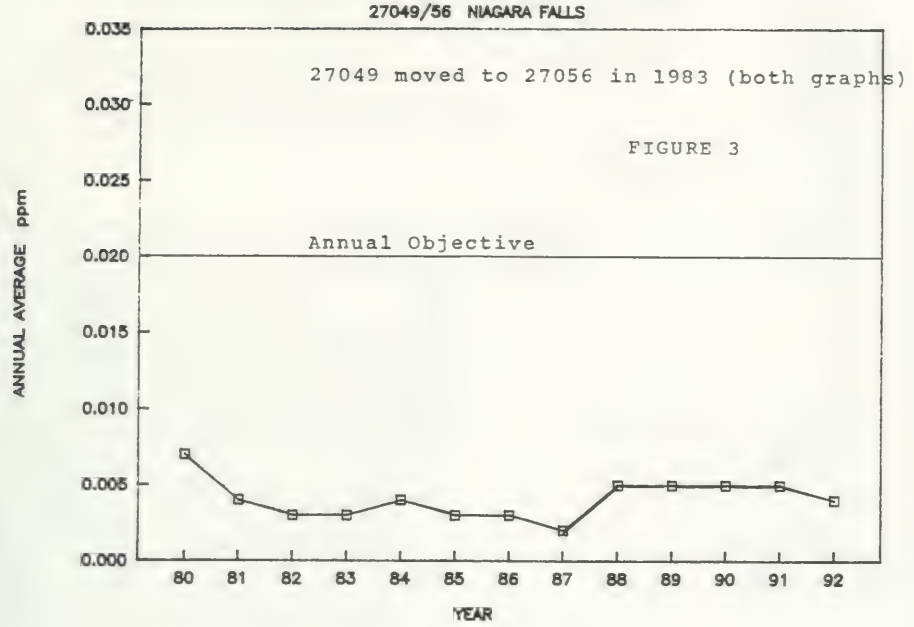
TABLE 2c
SUMMARY PARTICULATES - NIAGARA FALLS
micrograms per cubic metre

Ontario Objectives: 120 (24 hr)
60 (annual geometric mean)

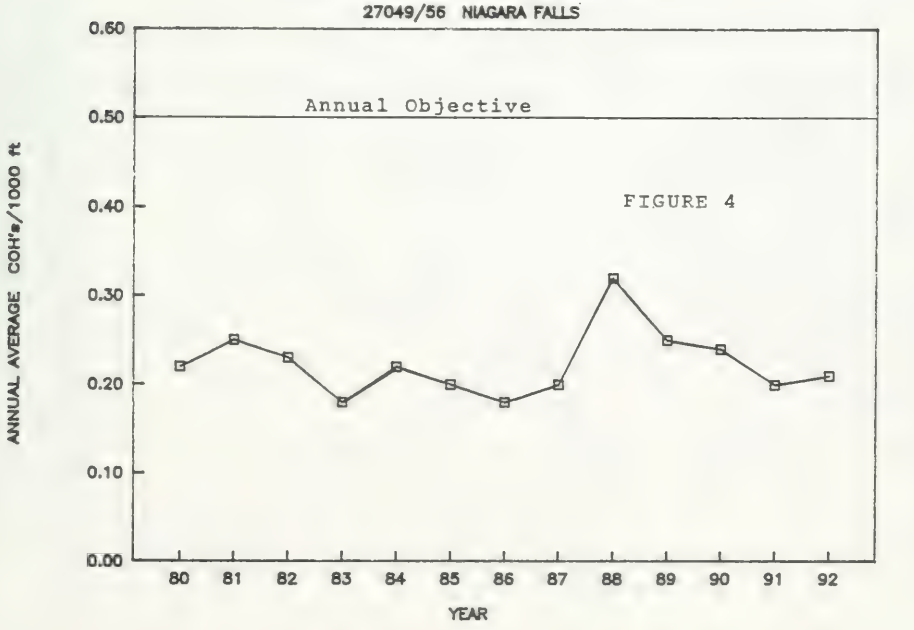
	Year	No of Samples	Geometric Mean	Maximum 24 hr	No of Samples > 120	Source Monitored
27056-Allendale	1992	56	35	86	0	Ambient
	1991	54	39	79	0	
	1990	52	38	105	0	
27055-Stanley	1992	54	78	285	12	General Abrasives
	1991	55	93	285	21	
	1990	52	85	262	14	
27050-Victoria	1992	58	43	154	2	Cyanamid
	1991	55	61	155	3	
	1990	51	74	156	9	

FIGURE 2
Niagara Falls AQI Station

SULPHUR DIOXIDE TREND

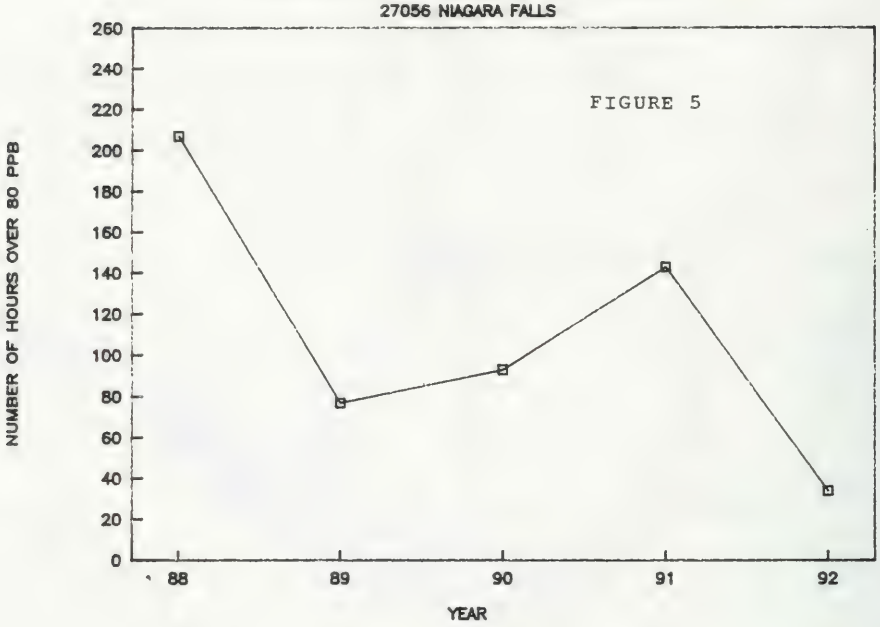


SOILING INDEX TREND



OZONE EXCEEDANCE TREND

27056 NIAGARA FALLS



SUSPENDED PARTICULATE TREND

27049/56 NIAGARA FALLS

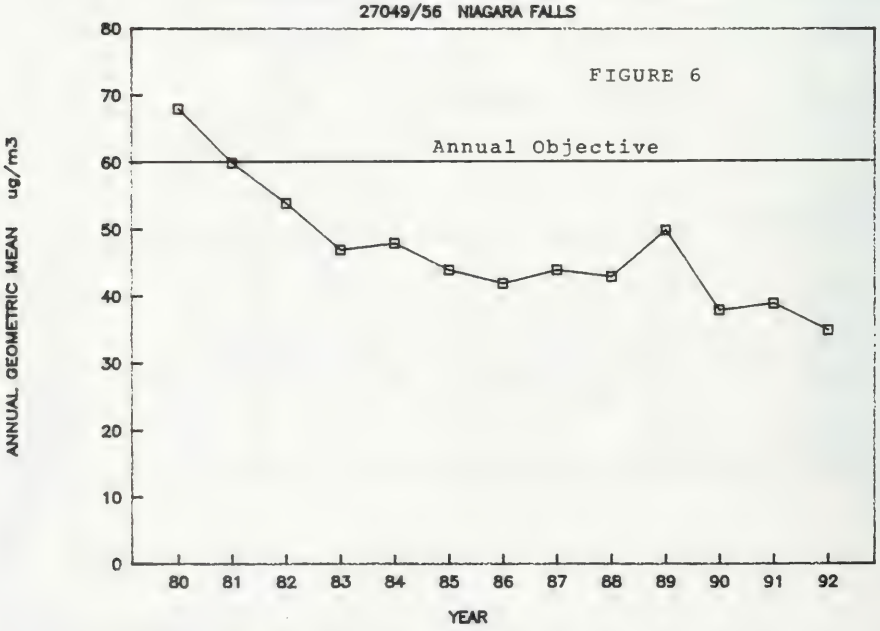
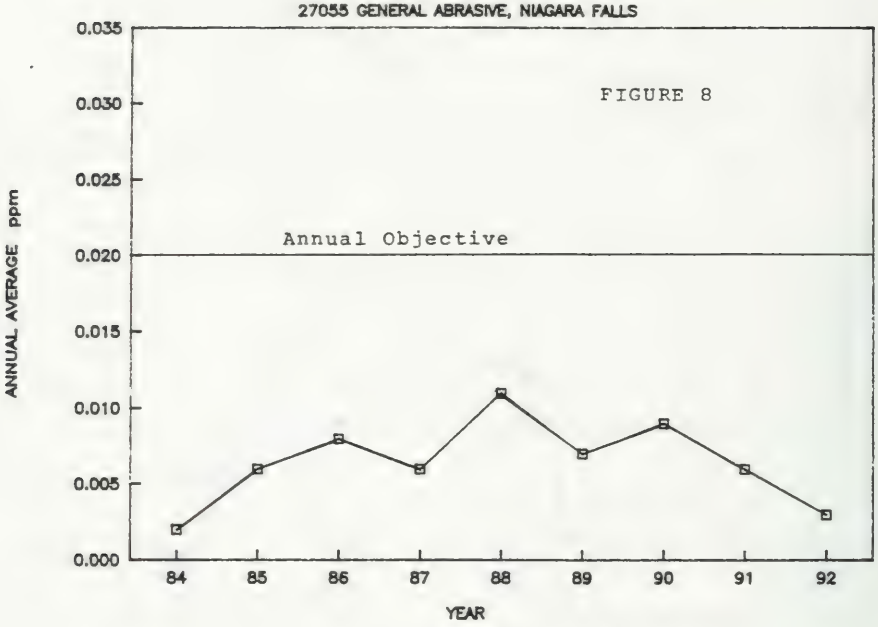


FIGURE 7
Niagara Falls Industry Stations

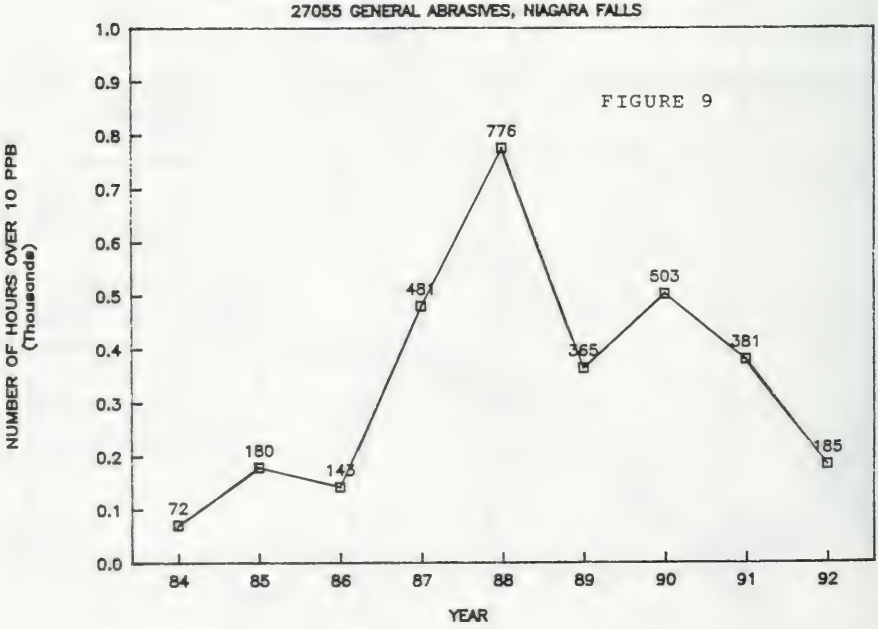
SULPHUR DIOXIDE TREND

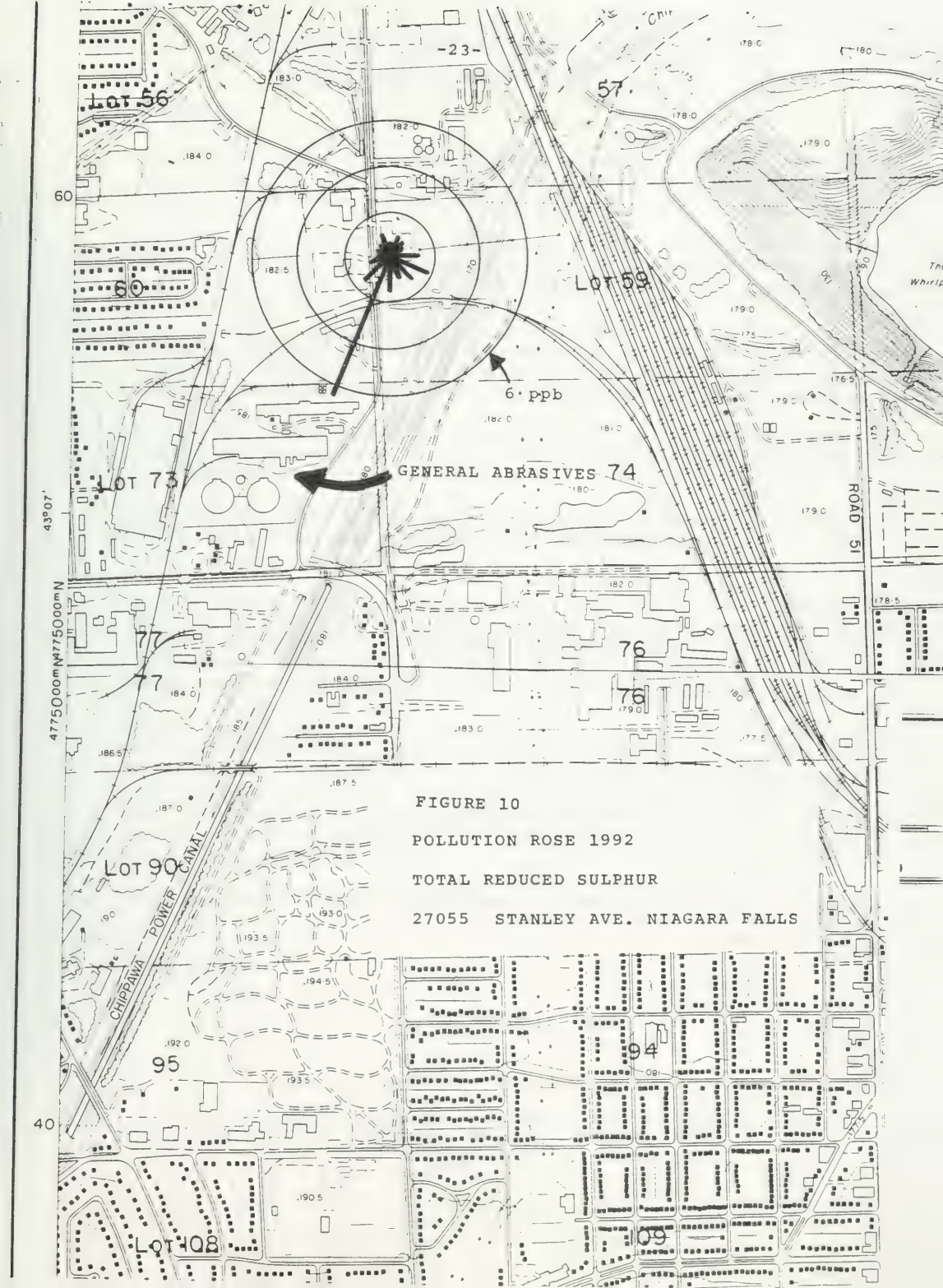
27055 GENERAL ABRASIVE, NIAGARA FALLS



TOTAL REDUCED SULPHUR TREND

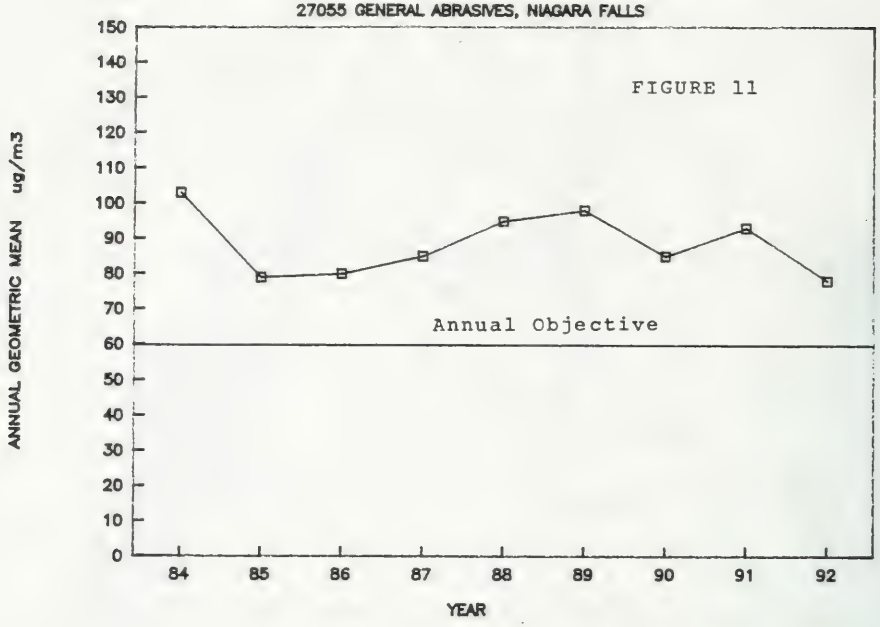
27055 GENERAL ABRASIVES, NIAGARA FALLS




-23-
Lot 56
57
60
60
Lot 59
6 ppb
GENERAL ABRASIVES 74
LOT 73
ROAD 51
43°07'
4775000mN
77
77
76
76
FIGURE 10
POLLUTION ROSE 1992
TOTAL REDUCED SULPHUR
27055 STANLEY AVE. NIAGARA FALLS
LOT 90
CHIPPAWA - POWER CANAL
95
94
40
LOT 108
109

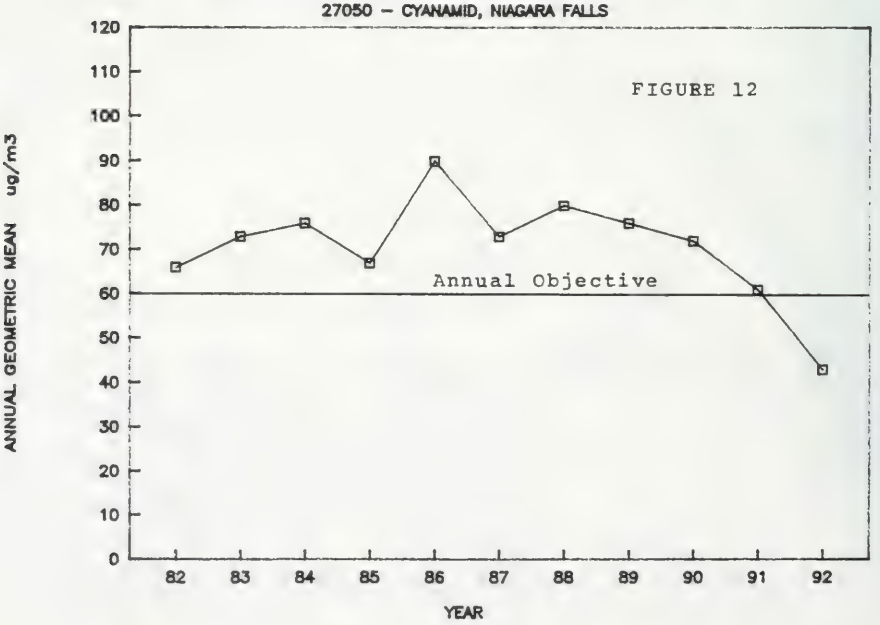
SUSPENDED PARTICULATE TREND

27055 GENERAL ABRASIVES, NIAGARA FALLS



SUSPENDED PARTICULATE TREND

27050 – CYANAMID, NIAGARA FALLS



4.2 Chippawa

Station 27051 at Norton and Portage, 200 metres northeast of the Norton Company (Figure 13) contained SO_2 and TRS analyzers and a hi-vol. Dustfall measurements were also made in the area. Data are summarized in Tables 3a and 3b.

All SO_2 objectives were met. In fact, the sulphur dioxide hourly objective has not been exceeded since 1982. The trend graph in Figure 14, illustrates the improvements registered at this station. Due to the low SO_2 levels measured for many years, this analyzer was removed from service at the end of 1992.

TRS levels were also low during both years. There were only 2 hours over a flag concentration of 10 ppb (the approximate odour threshold for hydrogen sulphide) in each year and the hourly objective for hydrogen sulphide (20 ppb) was not exceeded.

The SO_2 and TRS source at Norton is the processing plant for the aluminum oxide furnaces. Significant measured improvements are shown in Figure 15, however, the reductions in 1991/92 are attributed to reduced production.

Odour complaints near this plant continue to occur, so the station siting is being reviewed to see if it can be located closer to the plant and complaint locations.

Suspended particulate concentrations were measured near Station 27051 (Table 3b). The yearly mean was reduced to 43 ug/m^3 in 1992, below the yearly objective, and there were no samples above the daily objective. There were however, two daily exceedances in 1991. The trend graph in Figure 16 shows reduction in TSP levels dating back to 1974 due to various emission control improvements made at this plant and reduced production.

Dustfall at 27005, Portage and Legion (Figure 13) exceeded the monthly objective in only 2 out of 12 samples (Table 3c), in 1992 and not at all in 1991. The background jar (27006) at Bridgewater and Oliver measured no exceedances. Similar to TSP, dustfall levels at 27005 have improved greatly since the 1970's (Figure 17). The source of this dust at Norton is fugitive emissions from raw material handling and general housekeeping. The company has provided dust collection for some of the materials handling systems and has re-instituted the use of a road sweeper.

At the end of 1992 the control jar 27006 was terminated, but station 27005 is operational.

TABLE 3a
SUMMARY STATISTICS - CHIPPAWA
CONTINUOUS POLLUTANTS NEAR NORTON CO.
27051 - NORTON/PORTAGE

	Year	Average	Maximum 1 hr	Maximum 24 hr	Objectives 1 hr	Objectives 24 hr	Objectives 1 yr	No Times Over Objectives 1 hr	No Times Over Objectives 24 hr
Sulphur Dioxide (SO_2) - ppm	1992	0.002	0.09	0.02	0.25	0.10	0.02	0	0
	1991	0.005	0.07	0.05				0	0
	1990	0.004	0.08	0.02				0	0
Total Reduced Sulphur (TRS) ppb	1992	0.6	11		20 (H_2S)			0(2)*	
	1991	0.6	11					0(2)	
	1990	1.1	15					0(11)	

* Number in brackets refers to hours over 10 ppb odour threshold

TABLE 3b
SUSPENDED PARTICULATES - NEAR NORTON CO.
micrograms per cubic metre
27051 - NORTON/PORTAGE, CHIPPAWA

Ontario Objectives: 120 (24 hr)
60 (annual geometric mean)

Year	No of Samples	Geometric Mean	Maximum 24 hr	No of Samples > 120
1992	40	43	118	0
1991	55	56	228	3
1990	49	61	120	0

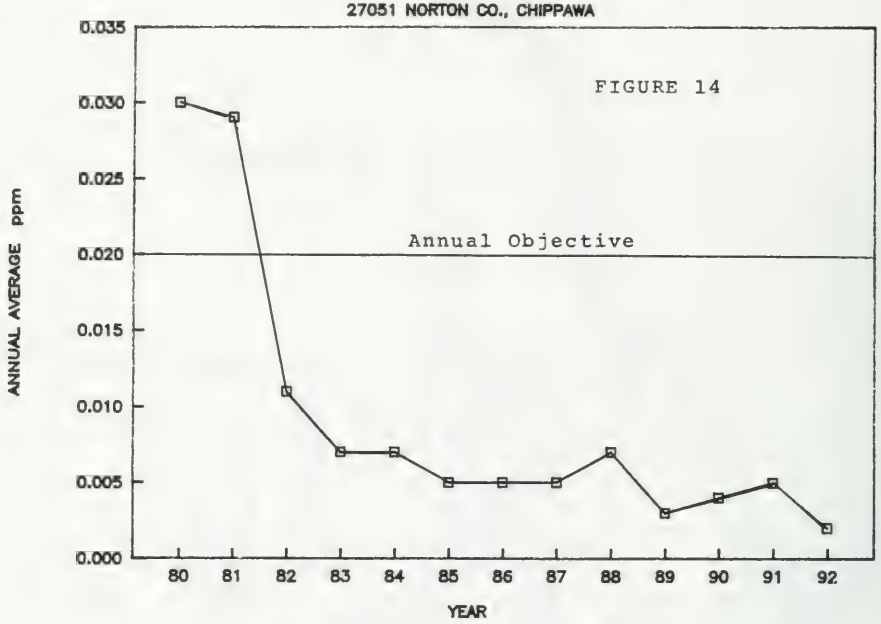
TABLE 3c
SUMMARY STATISTICS - CHIPPAWA
DUSTFALL NEAR NORTON CO.
GRAMS/SQUARE METRE/30 DAYS

Ontario Objectives 4.5 - annual
7.0 - 1 month

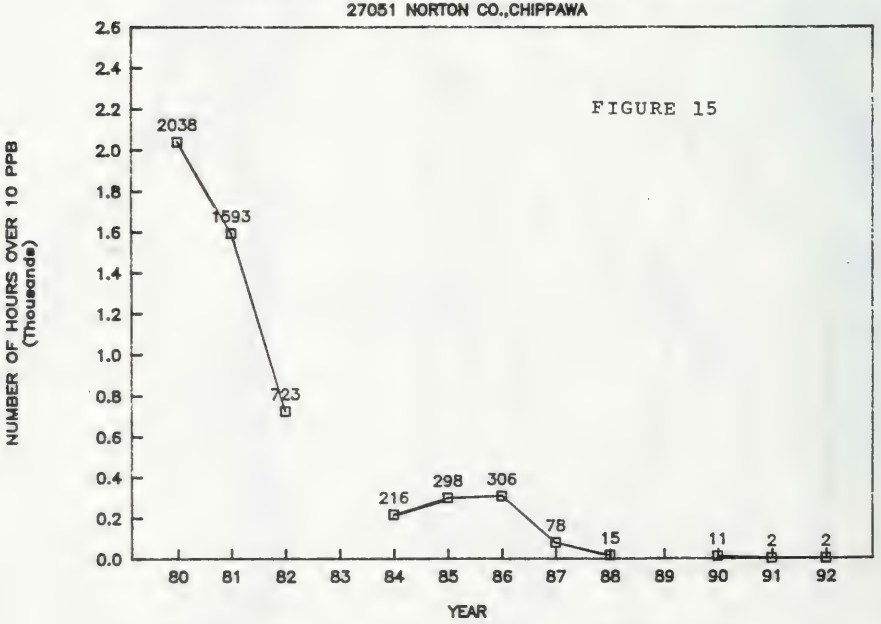
	Year	Average	Maximum	No. of Months Over Objective
27005 - Portage/Legion	1992	5.1	7.8	2
	1991	4.3	6.0	0
	1990	5.4	8.0	2
27006 - Bridgewater	1992	3.4	5.7	0
	1991	2.2	3.8	0
	1990	3.2	7.9	1

FIGURE 13
Chippawa Stations

SULPHUR DIOXIDE TREND

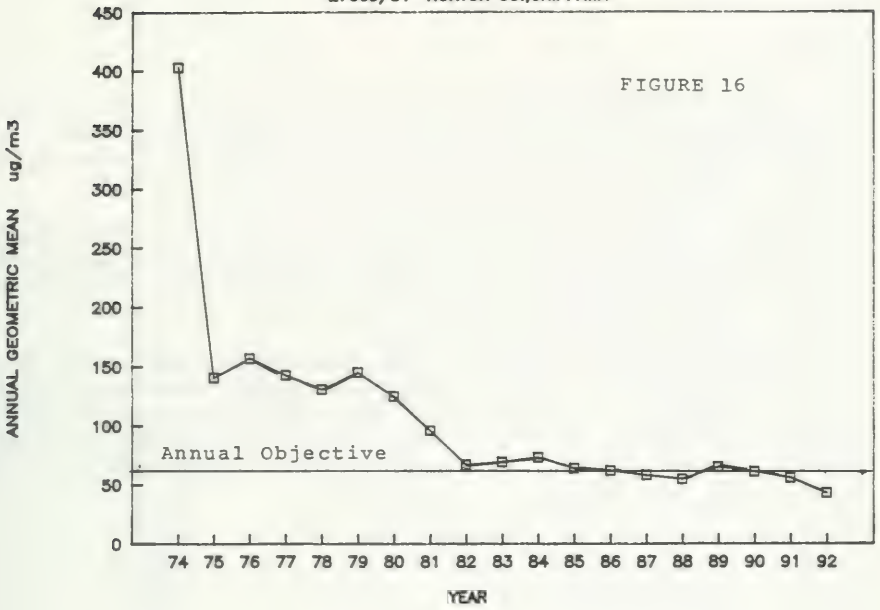


TOTAL REDUCED SULPHUR TREND



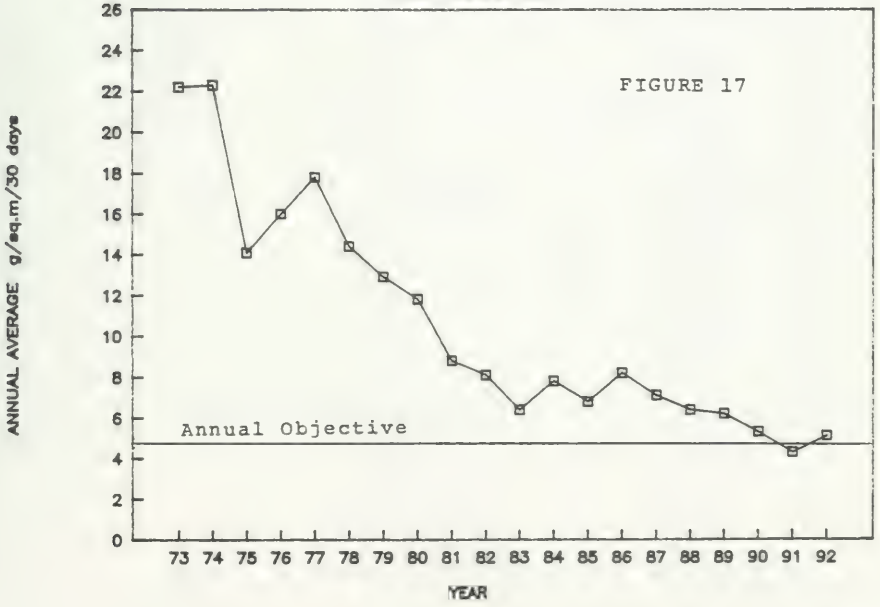
SUSPENDED PARTICULATE TREND

27009/51 NORTON CO.,CHIPPAWA



DUSTFALL TREND CHIPPAWA

27005 NORTON CO.



4.3 Port Colborne

Hi-vol 27047 measuring suspended particulates 350 metres north-northwest of INCO (Figure 18) recorded low and acceptable concentrations, similar to previous years (Table 4). The daily objective was not exceeded in either year. The refinery's effect on TSP levels appears to be minor. Southerly winds (from INCO) showed slight correlation with the data.

The samples were analyzed for nickel, and there were no levels measured above the objective (2 ug/m^3) in 1992 but there was one nickel exceedance in 1991. The source of this event is unknown. Sporadic events in the past may be attributed to fugitive emissions from the plant property, or to a process upset.

It would appear that INCO's effect on air quality was fairly small and localized. However, past Phytotoxicology Section surveys have demonstrated nickel contamination of vegetation in the area well above guidelines. The soil in the vicinity of the plant is nickel contaminated mostly from past practices rather than current operations, and re-entrainment accounts for some nickel deposition on vegetation. The company has purchased neighbouring properties in order to provide a buffer zone.

TABLE 4
SUSPENDED PARTICULATES NEAR INCO LTD.
micrograms per cubic metre
27047 - DAVIS/FRASER, PORT COLBORNE

Ontario Objectives 120 (24 hr)
60 (annual geometric mean)

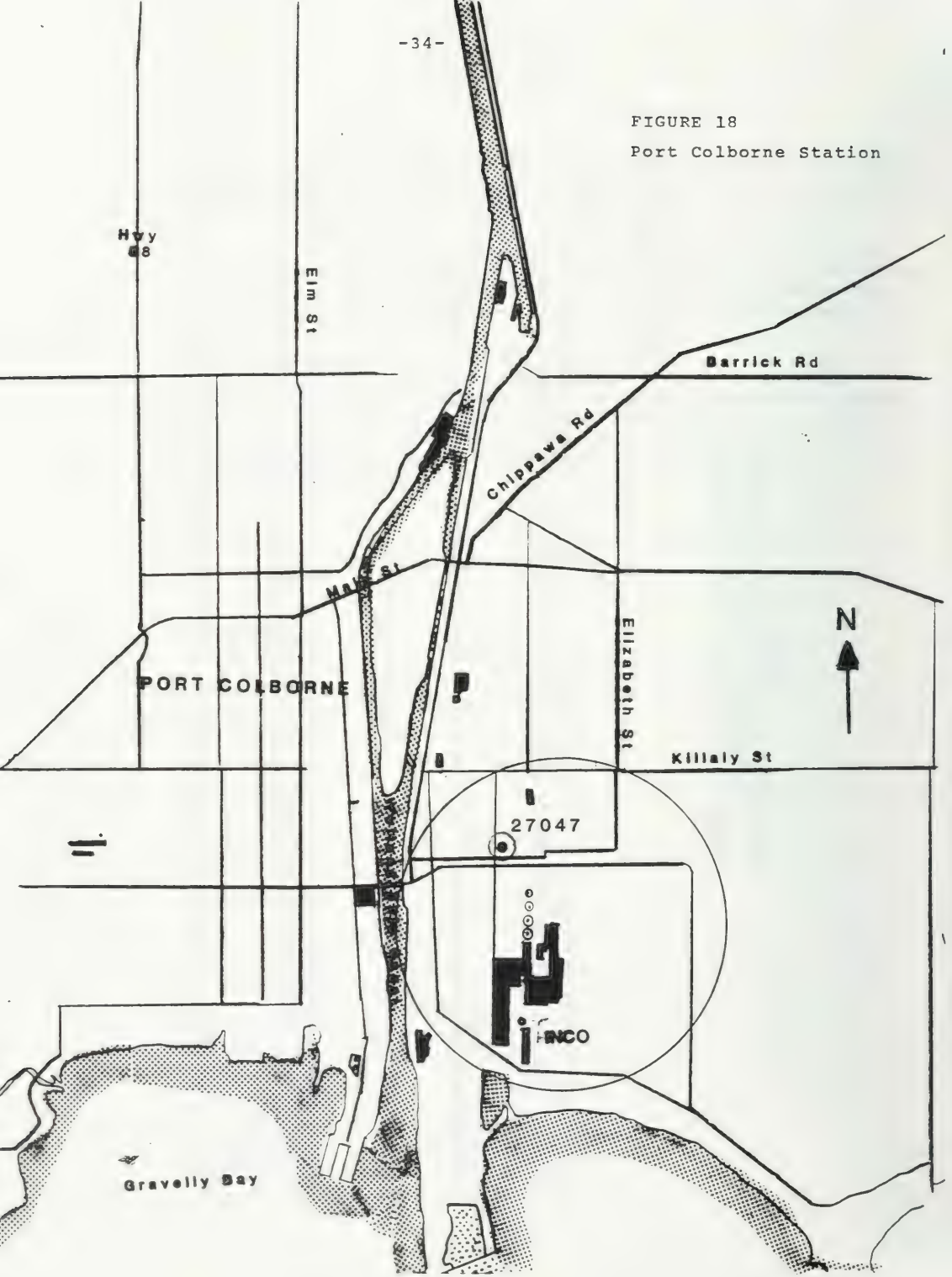
Year	No. of Samples	Geometric Mean	Maximum 24 hr	No. of Samples > 120
1992	54	41	119	0
1991	47	47	100	0
1990	55	50	132	1

NICKEL CONTENT

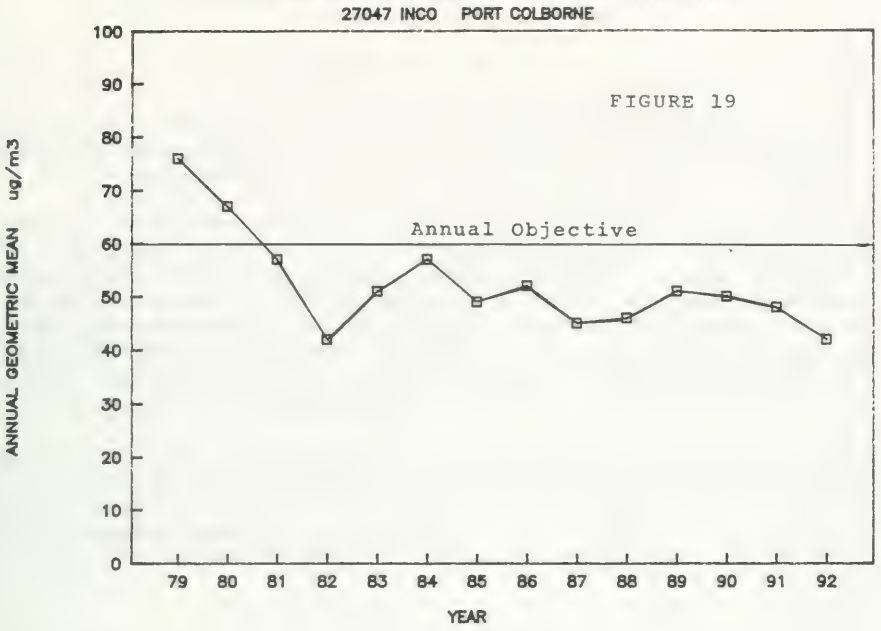
Ontario Objective: 2.0 (24 hr)

Year	No. of Samples	Geometric Mean	Maximum 24 hr	No. of Samples > 2.0
1992	54	.021	.69	0
1991	47	.032	4.51	1
1990	55	.039	.80	0

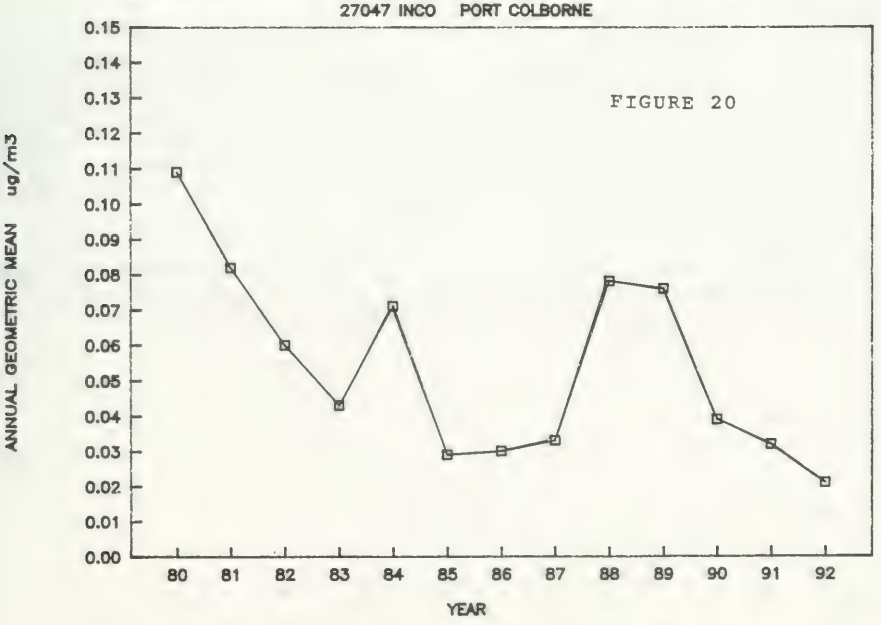
FIGURE 18
Port Colborne Station



SUSPENDED PARTICULATE TREND



NICKEL IN SUSPENDED PARTICULATE TREND



4.4 St. Catharines

The St. Catharines AQI station, 27067 is located on Argyle Crescent, off Eastchester Ave., just outside the downtown area (Figure 21). The station measured sulphur dioxide, carbon monoxide, nitrogen dioxide, ozone, soiling index and the Air Quality Index.

Sulphur dioxide, carbon monoxide, nitrogen dioxide and soiling index data for station 27067 are given in Table 5a and show low levels below all objectives. Trend graphs for these measurements (utilizing data from the old station 27037) in Figures 22 to 25 show low stable levels although CO did show marginal increases in 1988 at the new location. The higher CO levels indicate a greater effect of vehicle traffic than at the old North Street site. Most of the readings for soiling index, SO_2, CO, NO_2 fell in the Very Good range of the AQI (Tables 1a and 1b). A few COH readings fell in the Moderate Range (above 32) in both years. Most of these occurred during rush hours and were due mostly to traffic.

Ozone levels exceeded the hourly standard of 80 ppb 24 times in 1992 and 44 times in 1991 during the summer, all falling in the Moderate range of the AQI. Wind directions would suggest that most of the elevated levels were imported from the Ohio Valley in the United States, however Canadian input was present as well. Figure 26 shows the trend of exceedances from year to year. These variations are very dependent on the climate of each summer.

The hi-vol at downtown station 27008 measured acceptable suspended particulate concentrations (Table 5b), with no exceedance of the daily objective in either year. Annual trends given in Figure 27 show a gradual improvement in the past decade.

4.4.1. Monitoring Near ITT Aimco

Dustfall near the Aimco Foundry at the Plymouth Ave. station 27040 (Table 5c) has shown improvement in recent years as shown in Figure 28. Two samples exceeded the monthly objective in 1992 compared to 10 in 1990. Housekeeping was improved in 1991 through extensive landscaping, paving and oiling of high traffic areas, improved road sweeping and control of material handling operations. A solid perimeter wall was installed on two sides of the property in late 1991 to aid in dust and noise containment. These efforts have had a clear effect in reducing fugitive dust from the property.

A public liaison committee was formed in 1991 to address particulate and odour emissions from this foundry and two others in the vicinity. Aimco was convicted of an EPA violation in 1991 for a discharge of contaminants likely to cause an adverse effect.

4.4.2. Monitoring Near General Motors Foundry

Dustfall near the General Motors Foundry at Station 27041 Glendale and QEW, (Figure 21, Figure 25 and Table 5b) was also reduced with only 2 months exceeding the monthly objective in 1992 and 4 in 1991, compared to 10 in 1990. A nearby quarry and related trucking operations were potential contributors to the readings, and microscopic analyses of the samples did show that some samples were composed partly of silica/road dust. To ascertain the extent of the quarry's effect on 27041, a second jar (27063) was located directly on G. M. property, away from the quarry road. Data at this location showed concentrations lower on average to 27041 and yielded only one exceedance of the monthly objective for the two years combined. A successful control program at GM has satisfactorily reduced its emissions, but it seems evident that quarry traffic still affects 27041.

4.4.3. Monitoring near Burnstein Castings

Dustfall near Burnstein Castings at station 27054, Catherine and Russel (Figure 21), showed all monthly loadings below the objective (Table 5c) in both years. Due to economic conditions, this company ceased operations in late 1991. The dustfall sampling subsequently terminated in mid-1992.

TABLE 5a
SUMMARY STATISTICS - ST. CATHARINES
CONTINUOUS POLLUTANTS
27067 - ARGYLE CRES. AQI

	Year	Average	Maximum 1hr	Maximum 8hr	Maximum 24hr	Objectives 1hr	Objectives 8hr	Objectives 24hr	Objectives 1yr	No. Times Over Objectives 1 hr	No. Times Over Objectives 8 hr	No. Times Over Objectives 24 hr
Sulphur Dioxide (SO_2) - ppm	1992	0.005	0.10		0.03	.25		.10	.02	0		0
	1991	0.005	0.06		0.02					0		0
	1990	0.004	0.09		0.04					0		0
Soiling Index COHs/1000 ft	1992	0.26			1.6			1.0	0.5			2
	1991	0.25			1.1							1
	1990	0.25			1.1							1
Carbon Monoxide	1992	0.5	5	4		30	13			0	0	
	1991	0.7	6	3						0	0	
	1990	1.0	8	3						0	0	
Nitrogen Dioxide (NO_2) - ppm	1992	0.012	.07		0.04	.20		.10		0		0
	1991	0.016	.08		0.04					0		0
	1990	0.016	.09		0.04					0		0
Ozone (O_3) - ppm	1992	0.019	.107			.08				24		
	1991	0.025	.094							44		
	1990	0.024	.113							44		

TABLE 5b
SUSPENDED PARTICULATES
micrograms per cubic metre
27008 - KING ST. ST. CATHARINES

Ontario Objectives: 120 (24 hr)
60 (annual geometric mean)

Year	No. of Samples	Geometric Mean	Maximum 24 hr	No of Samples > 120
1992	53	40	111	0
1991	58	43	90	0
1990	49	45	156	1

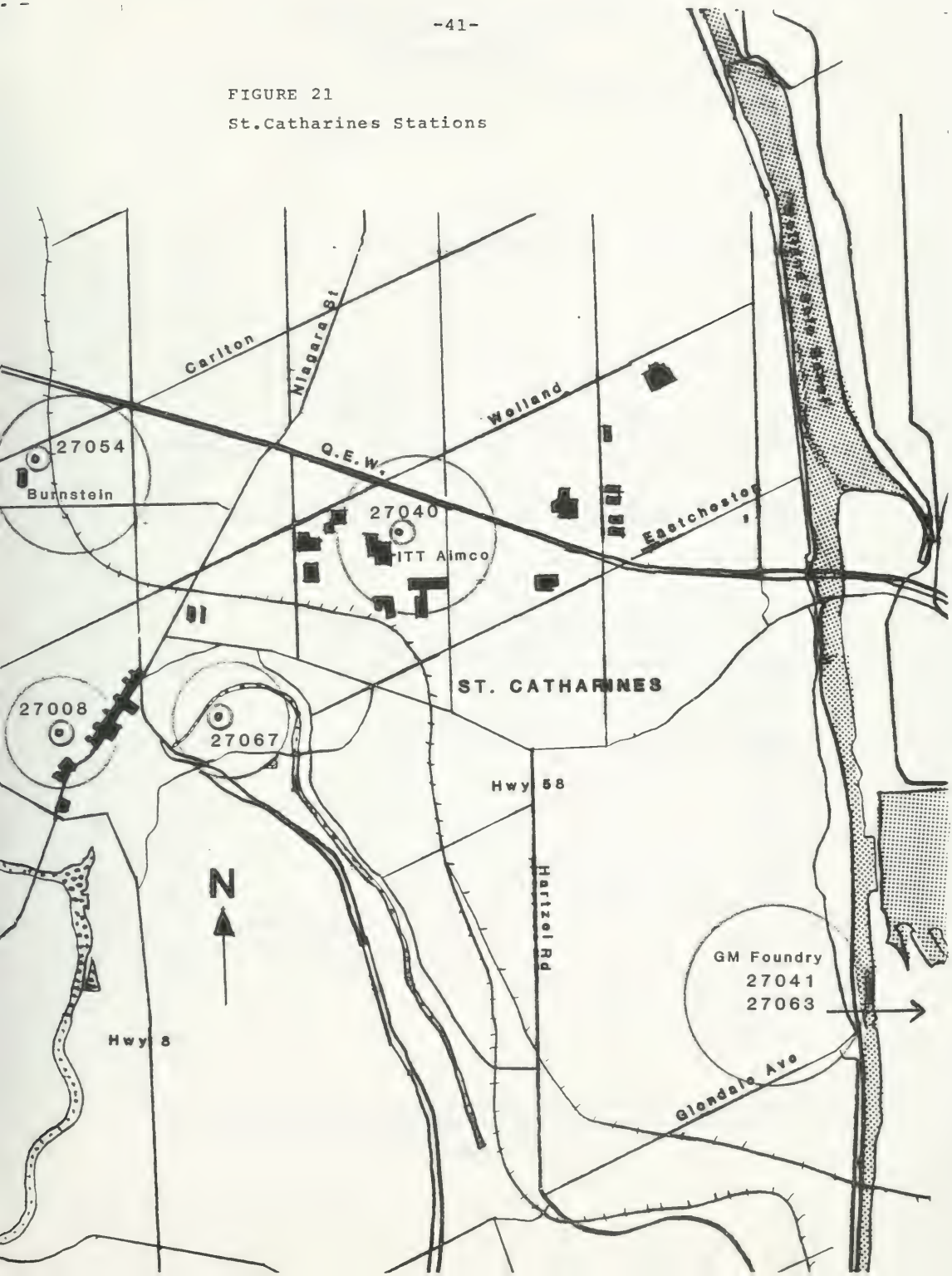
TABLE 5c
SUMMARY STATISTICS
DUSTFALL NEAR - ST. CATHARINES INDUSTRIES
grams/square metre/30 days

Ontario Objectives: 4.5 - annual
7.0 - 1 month

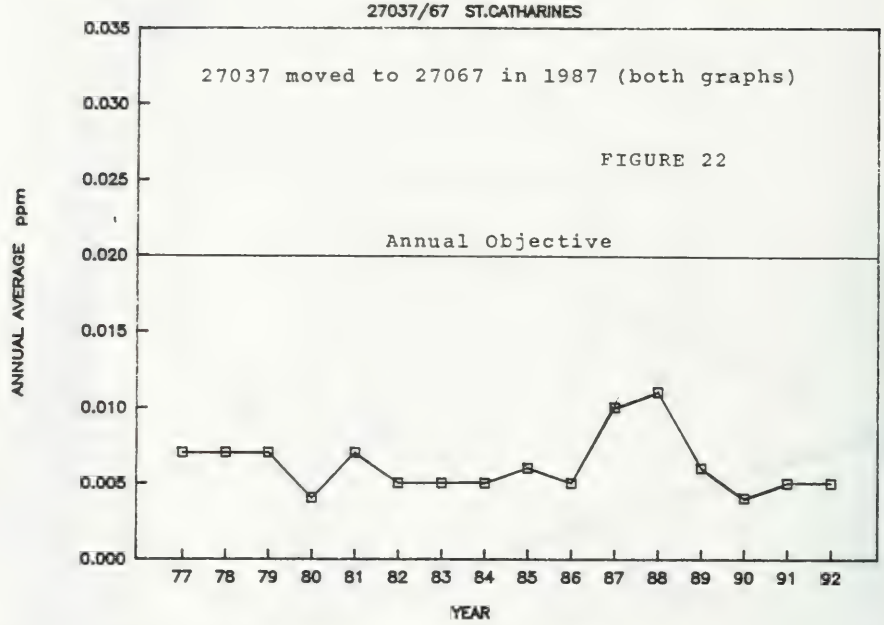
	Year	Average	Maximum	No. of Months Over Objectives	Source Monitored
27040-Plymouth Ave	1992	5.5	8.2	2	ITT Aimco
	1991	5.8	8.3	4	
	1990	8.8	13.6	10	
27041-Glendale	1992	5.7	9.0	2	GM
	1991	5.1	8.9	3	
	1990	8.1	13.4	6	
27063-GM Foundry	1992	4.3	9.2	1	GM
	1991	3.2	6.0	0	
	1990	6.4	12.5	4	
27054-Catherine/Russell	1992	3.2[5]	4.9	0	Burnstein Castings
	1991	4.0	6.2	0	
	1990	4.1	5.7	0	

5 - 5 months of sampling - terminated

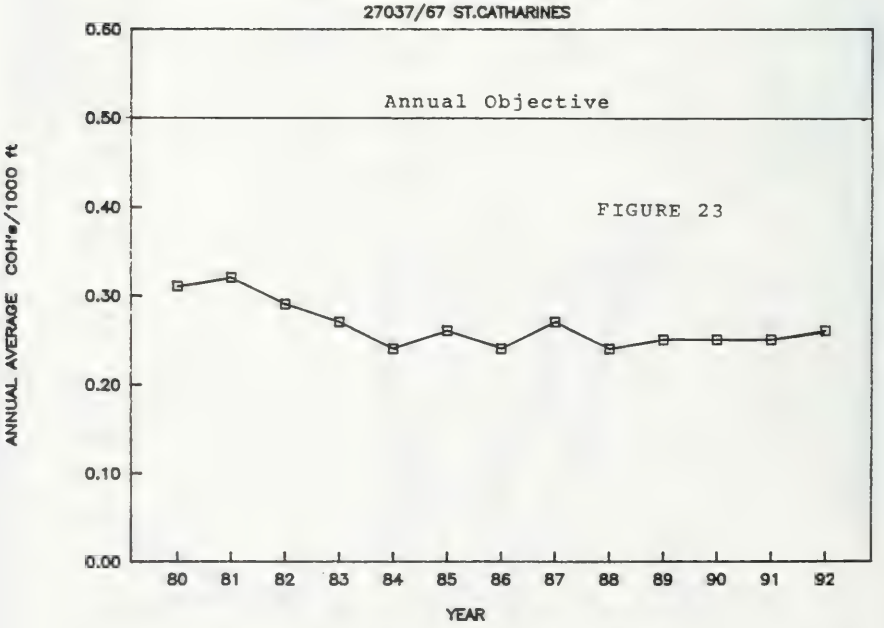
FIGURE 21
St.Catharines Stations



SULPHUR DIOXIDE TREND

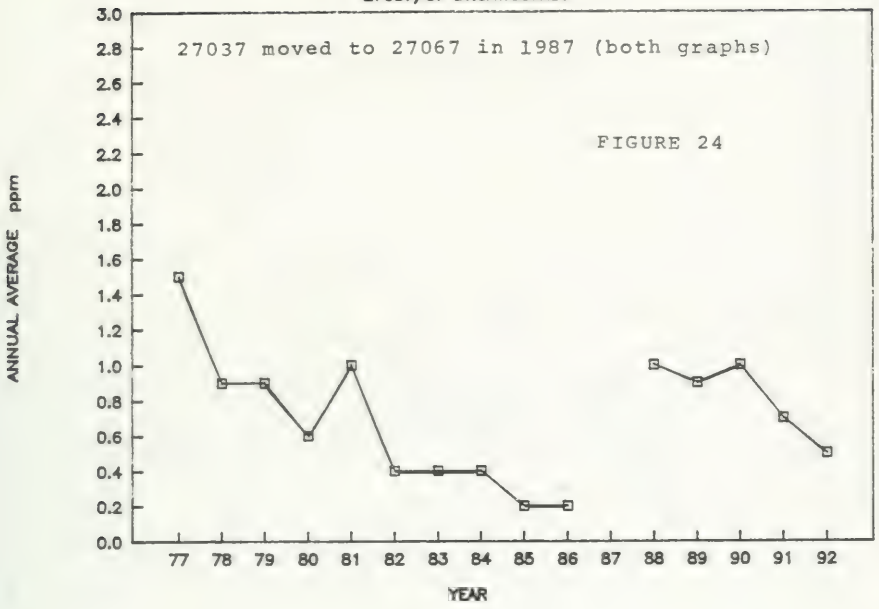


SOILING INDEX TREND



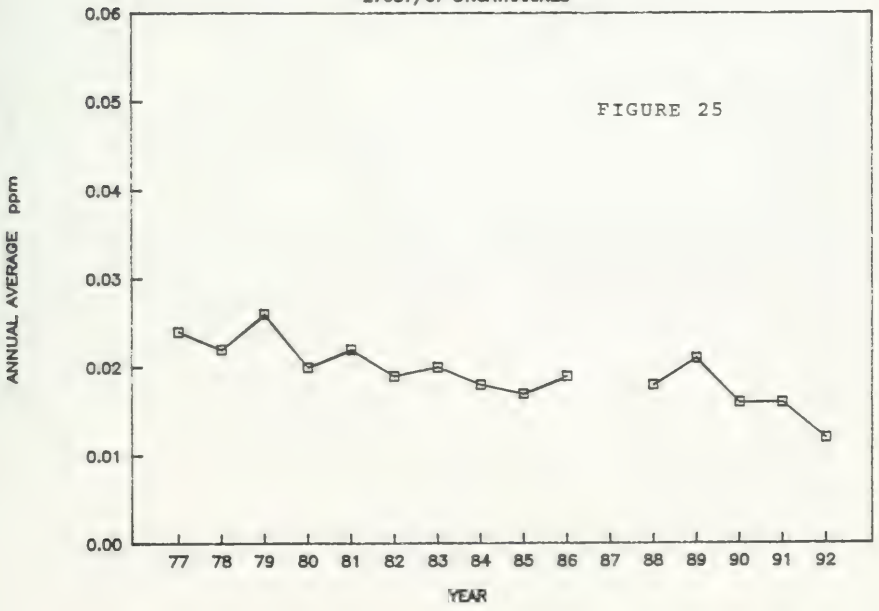
CARBON MONOXIDE TREND

27037/67 ST.CATHARINES

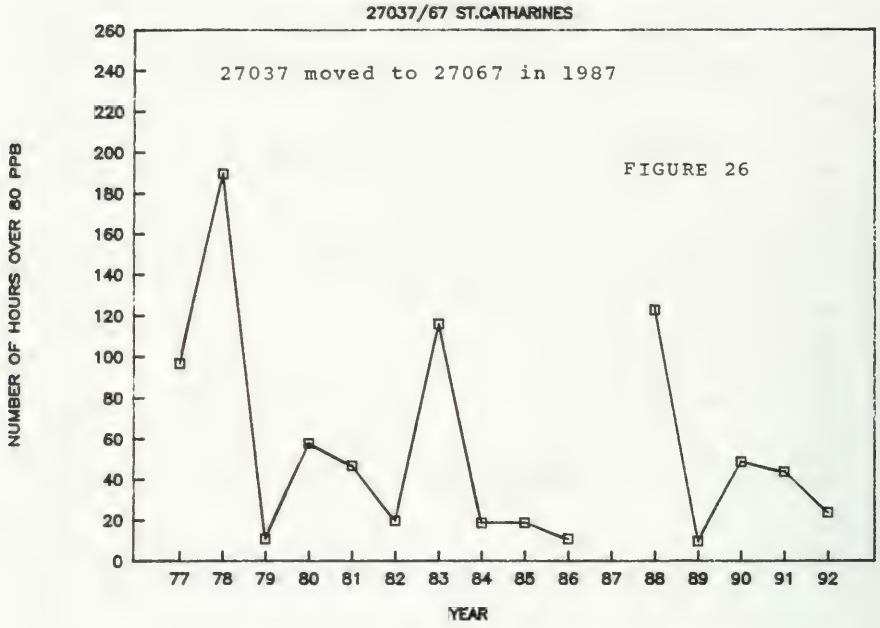


NITROGEN DIOXIDE TREND

27037/67 ST.CATHARINES



OZONE EXCEEDANCE TREND



SUSPENDED PARTICULATE TREND

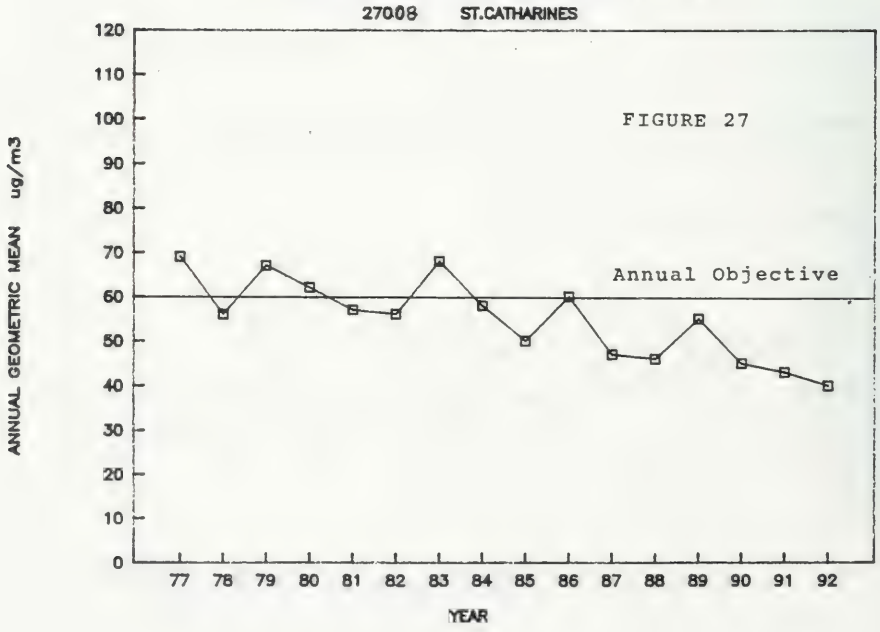
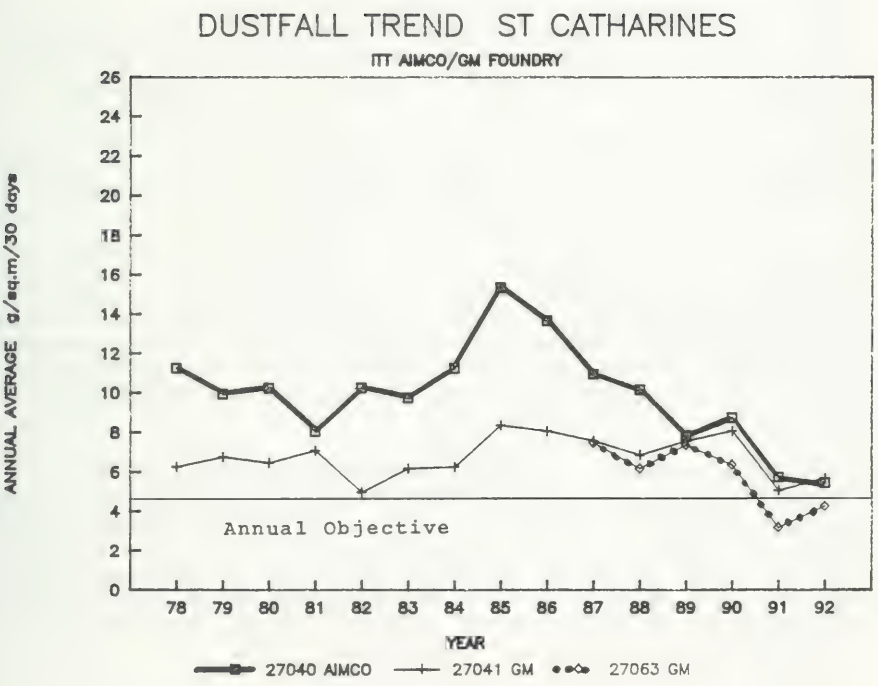


FIGURE 28


DUSTFALL TREND ST CATHARINES
ITT AIMCO/GM FOUNDRY
ANNUAL AVERAGE g/sq.m/30 days
26
24
22
20
18
16
14
12
10
8
6
4
2
0
Annual Objective
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
YEAR
27040 AIMCO
27041 GM
27063 GM

4.5. Thorold

4.5.1. Monitoring Near Exolon Limited

Station 27052 lies 100 metres northeast of Exolon Ltd. on Queen Street (Figure 29) and consisted of a standard hi-vol, a respirable particulates hivol (PM10), soiling index tape sampler and SO_2 and TRS analyzers. Data are summarized in Table 6a.

Sulphur dioxide levels were low and recorded no exceedances of the hourly or daily objective. TRS levels reduced substantially. There were no hours above the hourly objective for hydrogen sulphide (20 ppb) or above 10 ppb - an approximate odour threshold for H_2S. Figures 30 and 31 illustrate annual trends for SO_2 and TRS and show great improvements for both pollutants.

The major sources of these emissions used to be the silicon carbide furnaces. In October 1990, the company shut down these furnaces and the effect on TRS was dramatic. Levels fell to virtually zero and there were no further elevated TRS levels measured. Due to the low readings, both SO_2 and TRS analyzers were removed from service in mid-1992.

The soiling index tape sampler at 27052 recorded low levels of fine particulate with no exceedances of the daily or yearly objectives (Table 6a). Particulate emissions from Exolon would seem to consist mostly of heavy material not measured by the tape sampler. Consequently, the tape sampler was removed from service at the same time as the SO_2/TRS.

The shutdown of the silicon carbide furnaces also had an effect of reducing particulate emissions. Table 6b summarizes suspended particulate (TSP) data and newly introduced respirable particulate (PM10) monitoring. The TSP annual mean decreased to 61 ug/m^3 in 1992, barely above the objective of 60. Figure 32 illustrates the improvements which have occurred, particularly since 1987 when the station's annual mean peaked at 167 ug/m^3. There were a total of 10 samples out of 94 which exceeded the daily objective of 120 ug/m^3 in 1991/92.

The respirable particulate fraction (PM10) comprised just less than half of the total particulate loading measured by the regular hivol. Of greater importance, the PM10 filters were analyzed for a scan of 25 elements. Chromium levels exceeded the daily objective of 1.5 ug/m^3 (in TSP) in six PM10 filters during April to September 1991. There were no such exceedances measured in 1992, but several abnormally elevated chromium readings, just below the guideline were further measured. The filters of the adjacent hivol were specially analyzed for chromium for these 1991 dates, and confirmed the elevated loadings for chromium. Winds were southwest each time (ie downwind of Exolon).

The elevated chromium readings corresponded to production runs of an abrasive product using magnesium and chromium ores. In 1992, the Company made improvements to the raw material handling systems associated with this furnace. Future monitoring will determine if emissions have been reduced.

Unfortunately, following shutdown of the continuous SO_2/TRS instrumentation in mid 1992, power had to be disconnected, resulting in a suspension of the hivol/PM10 sampling in August 1992. Sampling restarted in 1993.

TABLE 6a
SUMMARY STATISTICS - THOROLD
CONTINUOUS POLLUTANTS NEAR EXOLON LTD.
27052 - QUEEN STREET

	Year	Average	Maximum 1 hr	Maximum 24 hr	Objectives 1 hr	Objectives 24 hr	Objectives 1 yr	No Times Over Objectives 1 hr	No Times Over Objectives 24 hr
Sulphur Dioxide (SO_2) - ppm	1992	0.006[6]	0.06	0.02	0.25	0.10	0.02	0	0
	1991	0.004	0.06	0.03				0	0
	1990	0.011	0.20	0.11				0	1
Soiling Index (CHs/1000ft)	1992	0.16[4]		0.5		1.0	0.05		0
	1991	0.19		0.8					0
	1990	0.20		0.6					0
Total Reduced Sulphur (TRS) ppb	1992	0.6[5]	7		20 (H_2S)			0(0)*	
	1991	0.3	10					0(0)	
	1990	2.1	89					208(402)	

6 - Exponent refers to number of months sampled - terminated

* Number in brackets refers to hours over 10 ppb odour threshold

TABLE 6b
SUSPENDED PARTICULATES - NEAR EXOLON LTD.
micrograms per cubic metre
27052 - QUEEN STREET, THOROLD

Ontario Objectives: 120 (24 hr)
60 (annual geometric mean)

Year	No. of Samples	Geometric Mean	Maximum 24 hr	No of Samples > 120
1992	38	61	145	2
1991	56	69	168	8
1990	53	75	164	9

RESPIRABLE PARTICULATE (PM10) - NEAR EXOLON LTD
micrograms per cubic metre
27352 - QUEEN STREET, THOROLD
(Co-located with 27052)

(No Objectives)

Year	No. of Samples	Geometric Mean	Maximum 24 hr
1992	38	26	60
1991	57	32	100

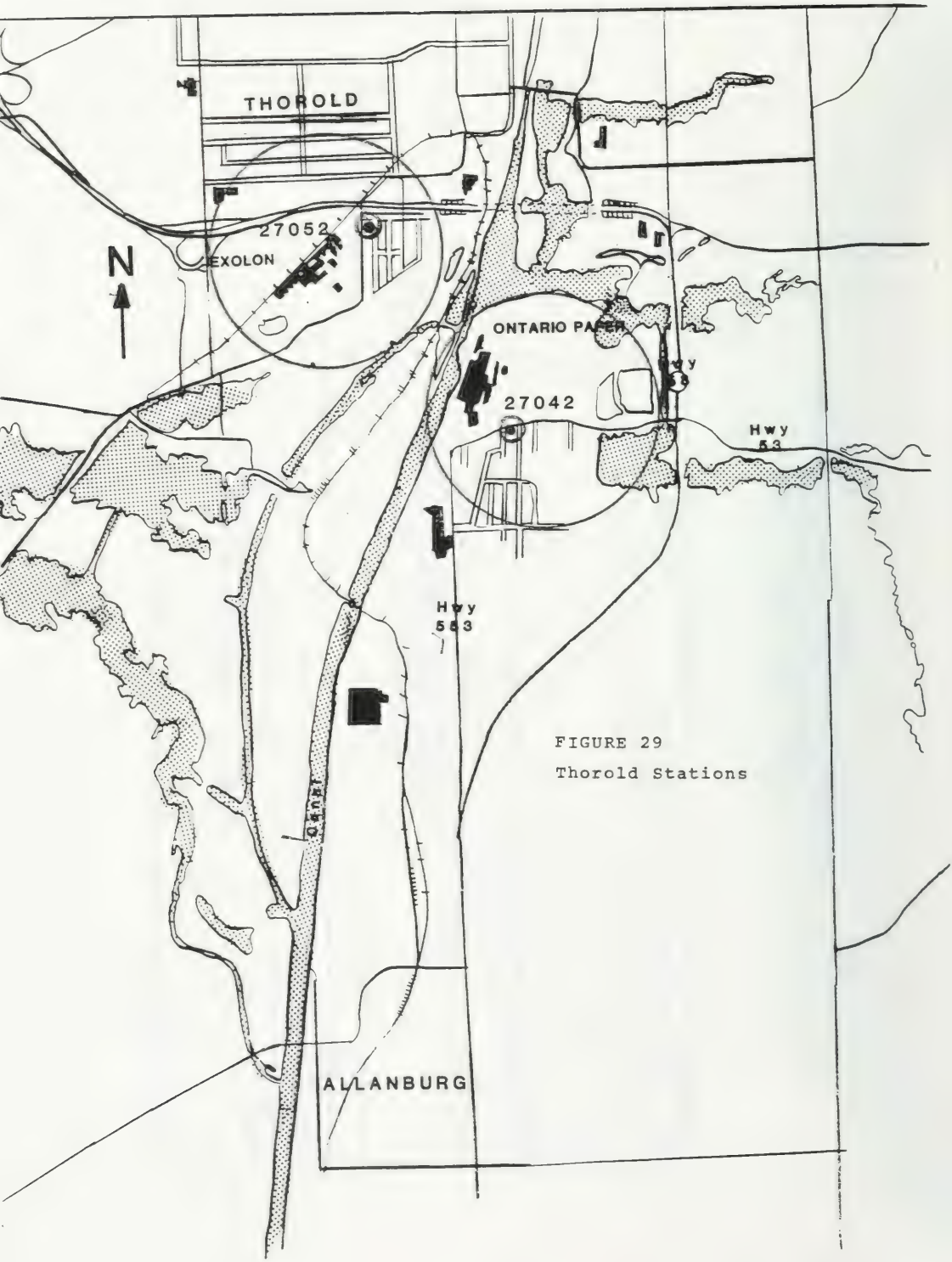
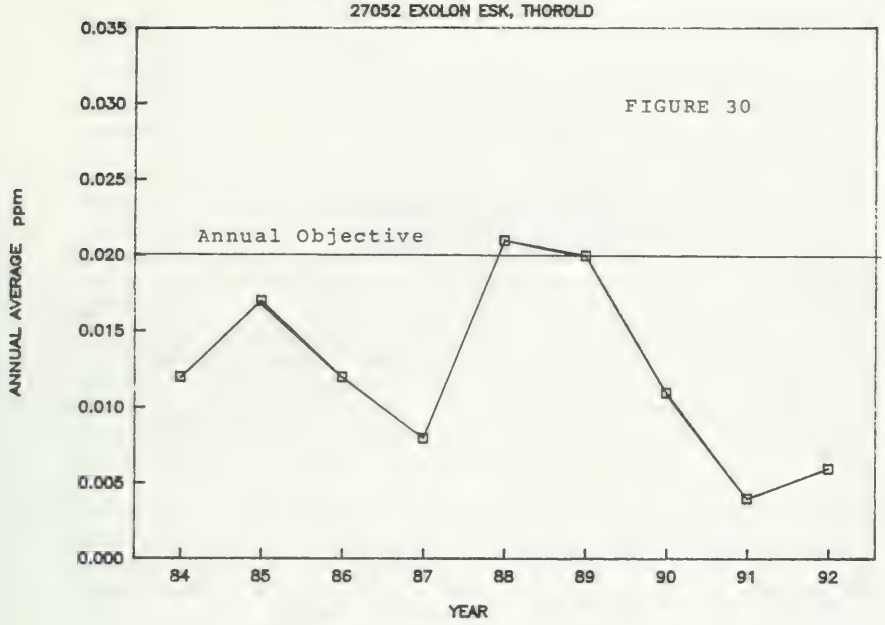
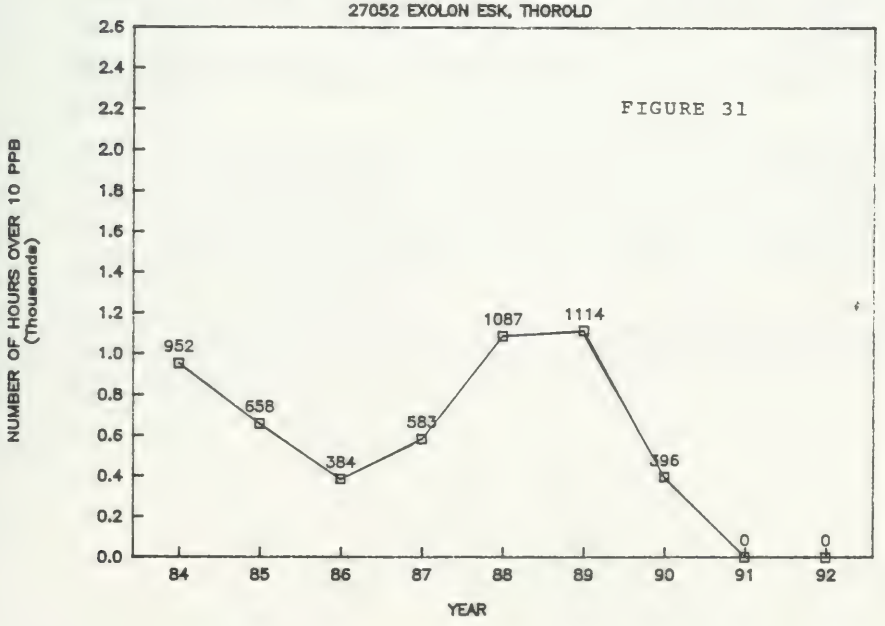


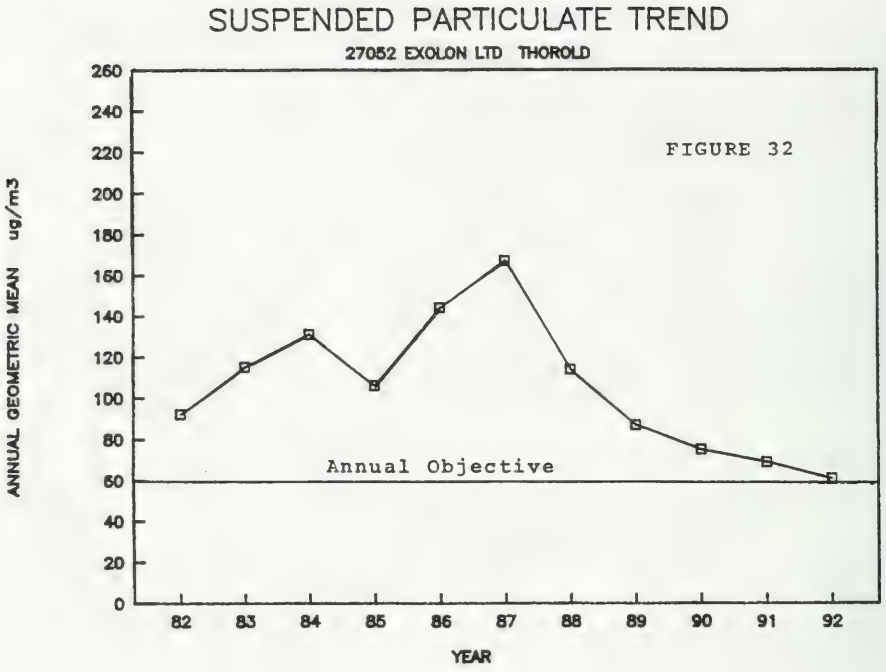
FIGURE 29
Thorold Stations

SULPHUR DIOXIDE TREND



TOTAL REDUCED SULPHUR TREND




SUSPENDED PARTICULATE TREND
27052 EXOLON LTD THOROLD
FIGURE 32
ANNUAL GEOMETRIC MEAN ug/m3
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Annual Objective
82
83
84
85
86
87
88
89
90
91
92
YEAR

4.6 Welland

Particulates near UCAR Carbon Canada (formerly Union Carbide) were measured by one hi-vol sampler and three dustfall jars (Figure 34). As well, a new monitor was operated for measurement of polynuclear aromatic hydrocarbons (PAH).

Suspended particulate concentrations at station 27045, Alberta and Devon, (Table 7a) reduced in 1992. The daily and yearly objectives were met. The trend graph in Figure 35 shows a slightly declining trend since 1981, below the yearly objective for TSP.

Occasionally elevated carbon concentrations (Table 7a) were measured, and these data correlated positively with southerly wind frequency, indicating UCAR Carbon's localized influence on the area. Since the company's emissions are carbonaceous in nature, the low density of these materials probably plays a role in the low suspended particulate levels as this is a weight based measurement. Carbon based particulate can have adverse soiling properties leading to complaints in the area. One major source of carbon particulate emissions at the plant is the carbottom furnaces. Trends in carbon levels are shown in Figure 36 and great improvements since the late 70s are apparent.

Dustfall (Table 7b) in the area has gradually declined over the years as shown by the trend graph in Figure 37. This decline is due mainly to various fugitive dust control efforts. One station,27035 at the base of Alberta St. continued to show the highest levels, it being the closest to the carbottom furnaces. Two samples exceeded the monthly objective there in 1992 and three in 1991. The other two monitors (27025-Harriet St. and 27026-Chaffey St.) recorded much lower levels with one exceedance of the monthly objective between them over the two years.

The company has been convicted of violations of the Environmental Protection Act resulting from particulate fallout incidents in recent years and fallout incidents continue to occur.

The Ministry will issue a Control Order to the company in 1993 to control the persistent black fallout.

The PAH sampler began operating in 1991 and collected 57 daily samples during the two years. Data for the 30 pollutants are summarized in Table 7c. The 24-hour objective for benzo(a)pyrene was exceeded 9 times in 1992 and 18 times in 1991. The plant appeared to be the source of the exceedances in all but a few occasions. There are several known PAH sources within the plant and the Control Order being issued to the company will require controls to reduce these emissions.

It should be noted that PAHs can be emitted by any incomplete fuel combustion, including woodstoves/fireplaces. Sources such as these may have been responsible for a small number of the BaP exceedances.

TABLE 7a
SUSPENDED PARTICULATES NEAR UCAR CARBON CANADA LTD.
micrograms per cubic metre
27045 - ALBERTA/DEVON - WELLAND

Ontario Objectives: 120 (24 hr)
60 (annual geometric mean)

Year	No of Samples	Geometric Mean	Maximum 24 hr	No of Samples > 120
1992	52	35	69	0
1991	58	49	131	1
1990	54	48	116	0

ELEMENTAL CARBON CONTENT

Year	No of Samples	Geometric Mean	Maximum 24 hr
1992	52	1.9	9.0
1991	58	2.3	10.7
1990	54	3.1	10.4

TOTAL CARBON CONTENT

Year	No of Samples	Geometric Mean	Maximum 24 hr
1992	52	5.4	12.7
1991	58	7.4	18.8
1990	54	7.8	20.4

TABLE 7b
SUMMARY STATISTICS - WELLAND
DUSTFALL NEAR UCAR CARBON CANADA LTD.
grams/square metre/30 days

Ontario Objectives: 4.5 - annual
7.0 - 1 month

	Year	Average	Maximum	No. of Months Over Objectives
27025-Harriet	1992	3.4	4.7	0
	1991	3.9	7.9	1
	1990	4.1	6.2	0
27026-Chaffey	1992	3.3	5.0	0
	1991	3.6	6.0	0
	1990	4.2	8.4	1
27035-Alberta Street	1992	5.4	12.4	2
	1991	5.4	9.3	3
	1990	8.6	17.7	7

TABLE 7c
POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)
NEAR UCAR CARBON CANADA LTD.
UNITS - nanograms per cubic metre
27069 - Alberta/Devon, Welland

		1992				1991			
	24 Hr Objective	No of Detects	Avg	Max	No. Times Over Obj.	No of Detects	Avg	Max	No. Times Over Obj.
PAH TOTAL		27	144.3	636.7		28	292.4	1116.9	
DIBENZO(A,H)ANTHRACENE		0				6	0.5	4.9	
BENZO(GHI)PERYLENE		11	0.6	4.0		16	3.1	28.0	
ACENAPHTHYLENE		27	6.1	31.7		17	3.9	22.9	
ACENAPHTHENE		24	19.2	108.5		27	58.3	408.5	
FLUORENE		26	12.4	64.1		27	20.3	66.2	
PHENANTHRENE		26	35.2	164.6		28	66.5	243.1	
ANTHRACENE		26	3.3	26.2		26	5.5	21.3	
FLUORANTHENE		27	17.0	130.2		28	32.6	175.9	
BENZO(A)ANTHRACENE		25	2.6	18.2		19	2.2	10.6	
CHRYSENE		26	6.5	33.0		25	12.3	68.2	
BENZO(K)FLUORANTHENE		20	2.3	14.3		20	5.1	20.4	
BENZO(B)FLUORENE		14	0.9	9.5		15	1.3	7.6	
BENZO(A)PYRENE	1.1	20	2.0	5.2	9	23	4.6	22.6	18
INDENO(123CD)PYRENE		12	1.2	8.4		17	2.7	25.1	
1-METHYLPHENANTHRENE		27	2.6	23.8		22	3.3	19.0	
2-CHLORNAPHTHALENE		1		13.6		11	2.6	17.6	
3-METHYLCHLORANTHRENE		3		1.4		5		7.0	
BENZO(A)FLUORENE		20	1.6	10.6		16	1.5	7.3	
BENZO(B)FLUORANTHENE		24	5.3	24.0		23	17.0	91.4	
BENZO(E)PYRENE		26	3.1	16.1		22	5.8	25.1	
BIPHENYL		25	7.0	17.5		19	9.7	106.8	
DIBENZO(A,C)ANTHRACENE		15	0.7	3.6		8	0.8	8.4	
9,10-DIMETHYLANTHRACENE		0				5		18.7	
7,12-DIMETHYLBENZO(A)ANTHRACENE		0				1	0.6	15.3	
						0			
M-TERPHENYL		1		0.2		0			
O-TERPHENYL		1		10.1		0			
PERYLENE		15	0.3	3.3					
P-TERPHENYL		1		1.7		2		0.6	
PYRENE		26	1.6	96.0		28	25.8	126.7	
TRIPHENYLENE		0				3		6.9	

FIGURE 33
Welland Stations

SUSPENDED PARTICULATE TREND

27045 UCAR CARBON CANADA, WELLAND

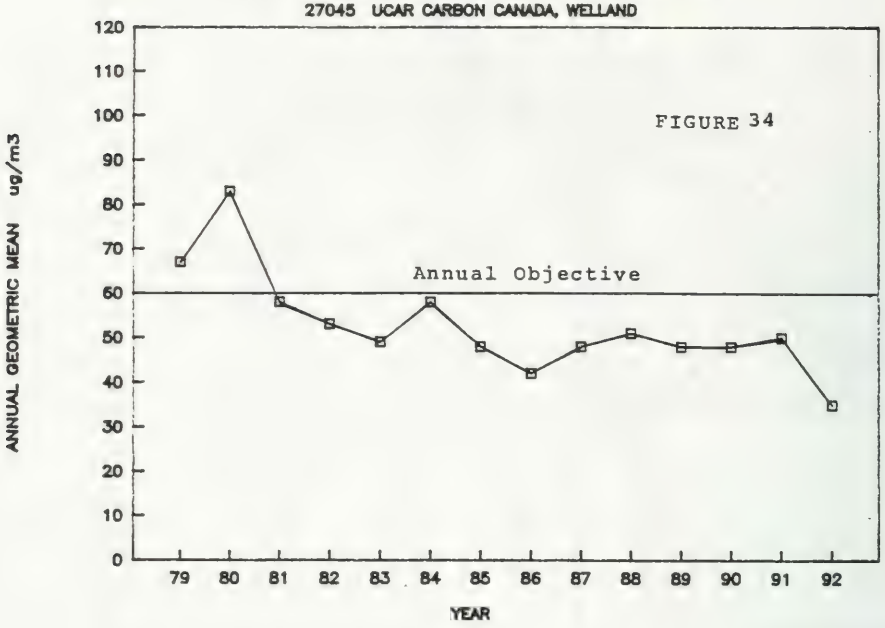


FIGURE 34

CARBON IN SUSPENDED PARTICULATE TREND

27045 UCAR CARBON CANADA, WELLAND

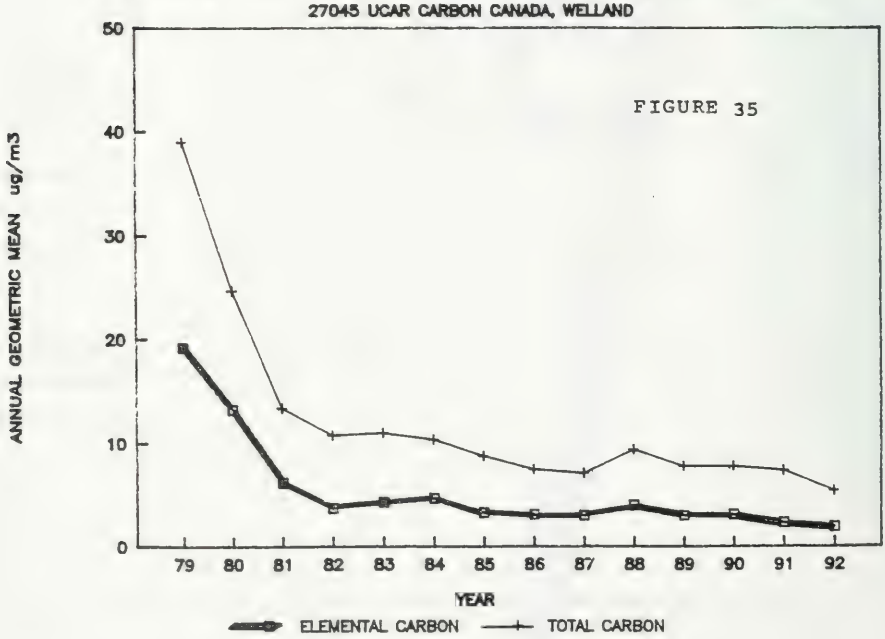
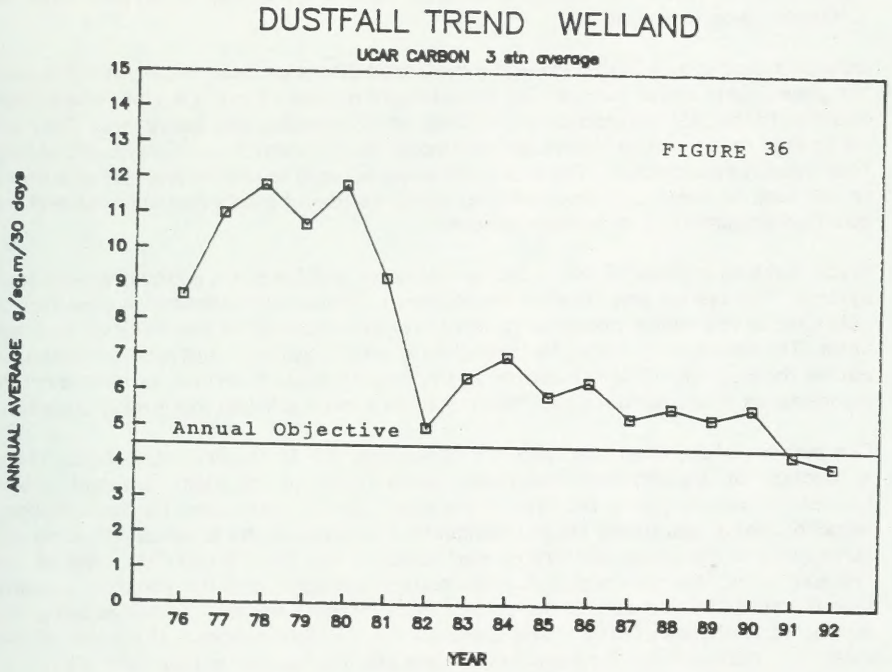


FIGURE 35


DUSTFALL TREND WELLAND
UCAR CARBON 3 stn average
FIGURE 36
ANNUAL AVERAGE g/sq.m/30 days
Annual Objective
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92
YEAR

5. SUMMARY

This report has identified several local air pollution concerns in the Regional Municipality of Niagara. All are currently under investigation with a view to implementing control programs. Some control programs are already underway.

Apart from these localized problems and with the exception of ozone episodes which were regional in scope across Southern Ontario, general air quality in Niagara Falls and St. Catharines was very good.

Long term programs in both Canada and the United States are being implemented to overcome the ground level ozone problem, but as an interim measure there is a joint Federal/Provincial initiative to forecast high ozone days in the summer in routine weather reports. The public will be advised that sensitive individuals may experience respiratory symptoms and should alter their activities accordingly. The public will be encouraged to reduce their use of automobiles, to car pool, to use public transit and to avoid the use of paints and solvents and gasoline powered equipment such as lawn mowers.

Much of the air monitoring conducted is automated and linked via a Province-wide telemetry system. This system permits all of the Ministry's stations with continuous analyzers to send data directly to a central computer facility in Toronto allowing for data retrieval on a real-time basis. The new system allows for immediate access to pollutant and wind/temperature data, both in the Regional office in Hamilton and in Toronto, and also allows for remote control and maintenance of the instruments. This results in a more efficient monitoring program.

One purpose of the telemetry system is to facilitate the Air Quality Index (AQI). The AQI is a function of six different pollutants, which form up to eight separate subindices. Concentrations of sulphur dioxide, soiling index, carbon monoxide, nitrogen dioxide, total reduced sulphur and ozone are all individually converted to the previous API scale of index numbers with the same advisory or alert levels of 32, 50, 75 and 100. Not all stations measure all of the parameters, but the highest subindex and the pollutant causing it is reported several times daily to the public. In the Niagara Region, the AQI is being reported for the St. Catharines (27067) and Niagara Falls (27056) stations. The intent of the new index is to better inform the people of Ontario about air quality in their local area.